

IN THE MATTER OF THE ADMINISTRATIVE  
CIVIL LIABILITY COMPLAINT AGAINST  
BYRON BETHANY IRRIGATION DISTRICT

IN THE MATTER OF THE DRAFT CEASE AND  
DESIST ORDER AGAINST THE WEST SIDE  
IRRIGATION DISTRICT

PHASE 1

*March 21-25, 28-30  
April 1, 4, 6, 2015*

*Prosecution Team  
PT EXHIBIT WR-253*

# Phase 1 Testimony: Katherine Mrowka, P.E.

- Program Manager for Enforcement
- Manage units responsible for complaint inspections, compliance inspections, drought response, development of regulations, and other tasks, including enforcement actions
- Actively participated in and helped to direct the 2015 water availability analysis
- Prosecution Team lead

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# California's Drought

- 2015 fourth year of drought
- Worst drought in decades
- Lowest snowpack on record
- January 17, 2014 - Drought Emergency Proclamation; SWRCB notified right holders
- April 25, 2014 - Proclamation of a Continued State of Emergency
- April 1, 2015 - Executive Order B-29-15

# Water Rights Management in Drought

- SWRCB has authority to prevent unauthorized diversions
- Necessary to ensure senior rights get water they are entitled to
- Sufficient water must remain in streams for senior demands
- Continued diversion by junior diverters when no water available impacts senior rights
- Division's duties - drought water supply analysis & enforcement

# 2015 Drought Water Supply Analysis

- 1977 Drought Report conceptual template
- No analysis like this in recent years
- Methodology evolved from 2014 into 2015 with new & better information

# West Side & BBID Water Availability

Based on drought water supply & demand analysis -

- No water available for priority of WSID License 1381 as of May 1, 2015
- Notice sent to WSID May 1, 2015
- No water for BBID pre-1914 right as of June 12, 2015
- Notice sent to BBID June 12, 2015

# Drought Water Availability Analysis

- Drought supply and demand analyses conducted leading to notices of unavailability of water
- Drought analysis is different than site-specific analysis used in permitting decisions. Permitting analysis is based on face value of rights.
- Drought analysis determines availability for water right priorities over entire watersheds during drought based on right holder water demand
- Division hadn't done a drought water availability analysis of this scope in modern times.

# Phase 1 Testimony: Brian Coats, P.E.

- Employee of the State Water Board, Division of Water Rights for the past 16 years.
- B.S. in Chemical Engineering from UC Davis (1996).
- Registered Professional Chemical Engineer in California.
- Supervised by Kathy Mrowka and John O'Hagan.
- Supervision of Jeff Yeazell, engineer in enforcement unit.
- Current duties include compliance & enforcement of water rights and coordinating supply and demand analysis for select watersheds.

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# Purpose of Testimony

- Since January 2014, involved with Supply & Demand analysis
- Written testimony outlines the 2015 Supply & Demand analysis
- I will testify as to the data or inputs used in the analysis, and Mr. Yeazell will testify as to how the data was collected, organized and analyzed.
- Mr. Yeazell reported the outcome of the analysis to me which was relayed to Ms. Mrowka, who decided if enforcement actions should proceed.

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# Water Rights Primer

- “First in Time, First in Right.”
- Drought Hydrology limits water allocation
- Three main classes—riparian, pre-1914 and post-1914.
  - Riparian: generally most senior priority due to majority of transfer in late 1800s; not allowed to store water, can only divert; all have equal priority relative to each other.
  - Pre-1914 claims: made prior to the Water Commission Act of 1914; most are junior to riparian but can divert non-natural or abandoned sources of water.
  - Post-1914 claims: rights accrued after WCA (1914).

# Types of Water

- **Natural** – Rainfall & runoff that has not been diverted for use. Subject to priority allocation. Adjustment for return flows, if applicable.
- **Stored** – Water that has been diverted to storage for later use. Party collecting water to storage has the paramount right to that water.
- **Abandoned** – Water that has been used for a purpose with the excess or unneeded amount released with no claim of ownership. Only available for diversion by pre-1914 and post-1914 classes.
- Due to a diverter's uncertainty of the type of water available at their diversion, Division staff may issue water shortage notices to clarify.

# Drought & Informational Order

- Kathy Mrowka testified about Governor Brown's drought proclamation and Executive Order.
- Following April 2014 proclamation
  - Division issued Order 2015-0002-DWR, an informational order requesting supporting information, 2014 water use records and projected 2015 diversion amounts.
  - Division staff incorporated the informational order calculations into the 2015 water availability analysis.

# Notices of Water Unavailability

- Letters informing water right holders that, due to a supply shortage, water is unavailable at their priority of right.
- Exceptions – Power or other non-consumptive uses, stored water.
- Notices only consider the specific water right and not separate alternative bases of rights such as contracts, private agreements, transfers or groundwater supplies.

# 2015 Notices of Water Unavailability

- May 1, 2015: Notice issued to post-1914 rights (WSID) in Sacramento River, San Joaquin River and Delta
- June 12, 2015: Notice issued to pre-1914 rights with 1903 or later priority (BBID) - Sacramento, San Joaquin & Delta
- Both notices reflect staff determinations that available water was insufficient to meet demands.
- Notices were in place until September 17, 2015 (BBID) and November 2, 2015 (WSID).

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# Supply & Demand Analysis

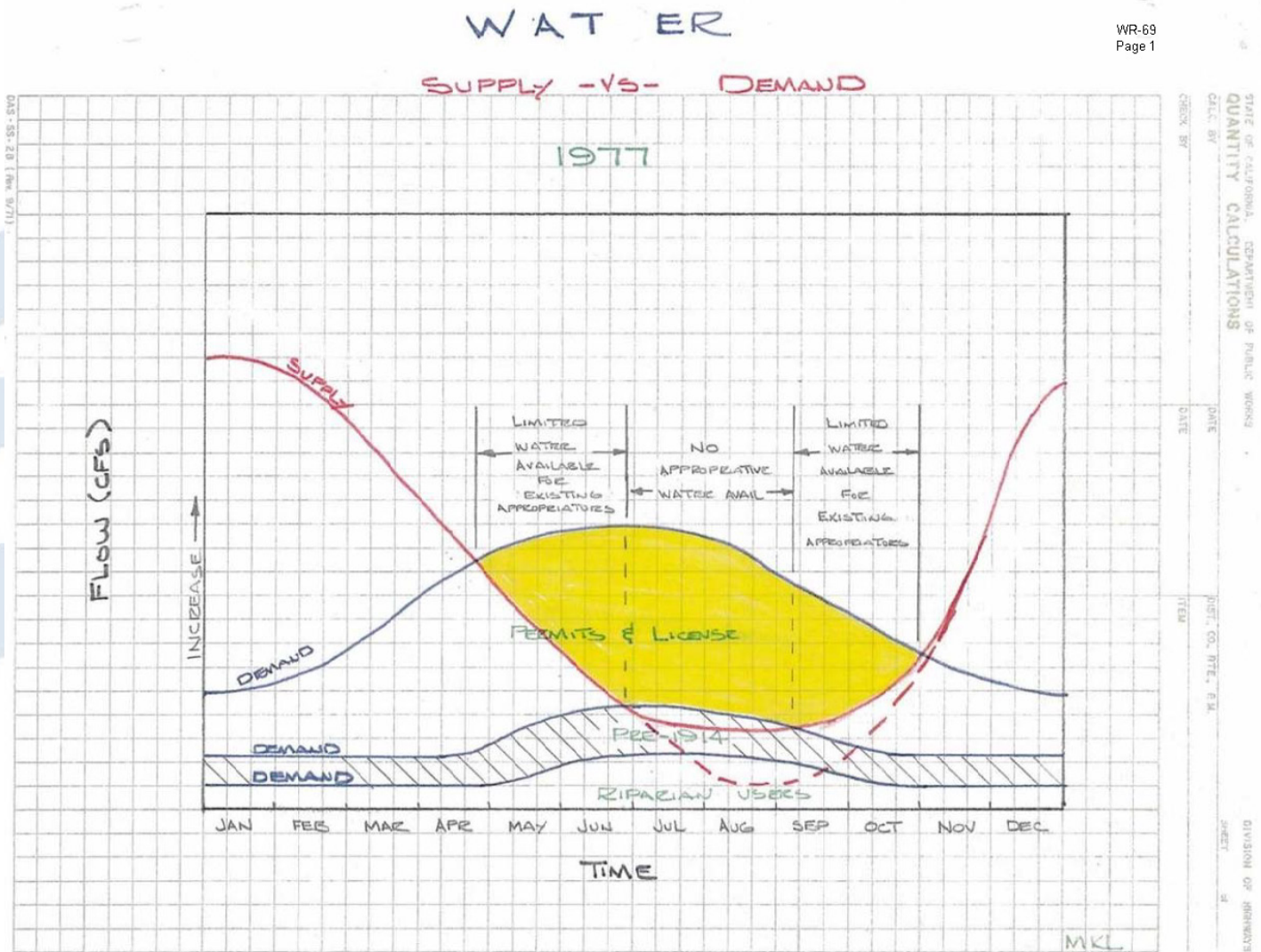
- Prior to issuing notices of water unavailability, Division staff compared supply and demand.
- Division staff performed a similar analysis in 1977 comparing the natural water supply with water right demand, by month.
- Starting point for the 2014 and 2015 analyses was a graphical summary prepared by Division staff Mert K. Lininger, program manager in the Application Section in 1977.
- Graphical summary prepared alongside the 1977 Dry Year Report (WR-152; WR-79).
- In 2014 and 2015, the 1977 analysis was adapted to current conditions and incorporated the best available information.

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# 1977 Supply & Demand Analysis



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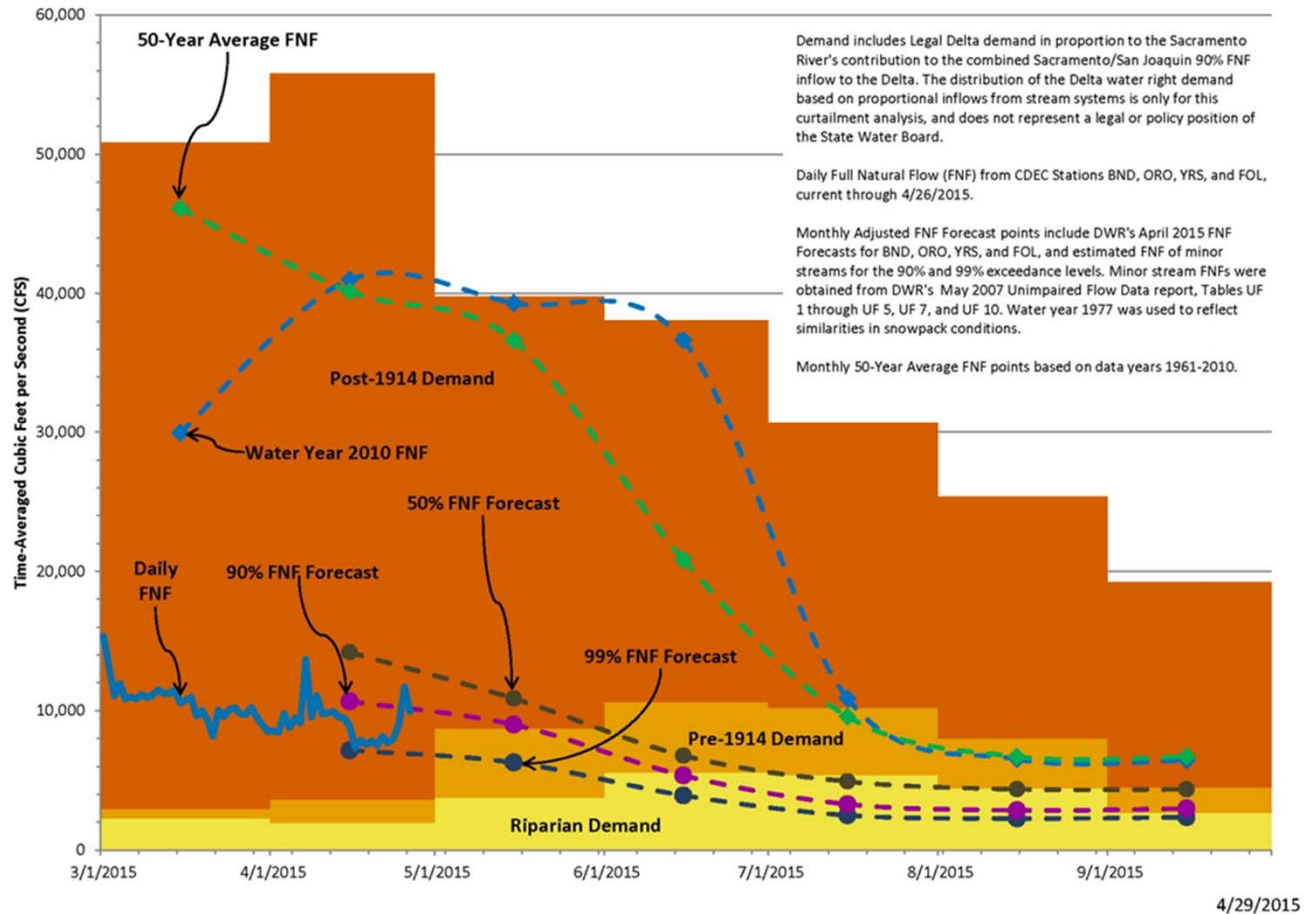
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# 2015 Supply & Demand Analysis - WSID

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2015 Sacramento River Basin Supply/Demand



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# 2015 Supply & Demand Analysis - BBID

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## 2015 Combined Sacramento/San Joaquin River Basin Senior Supply/Demand

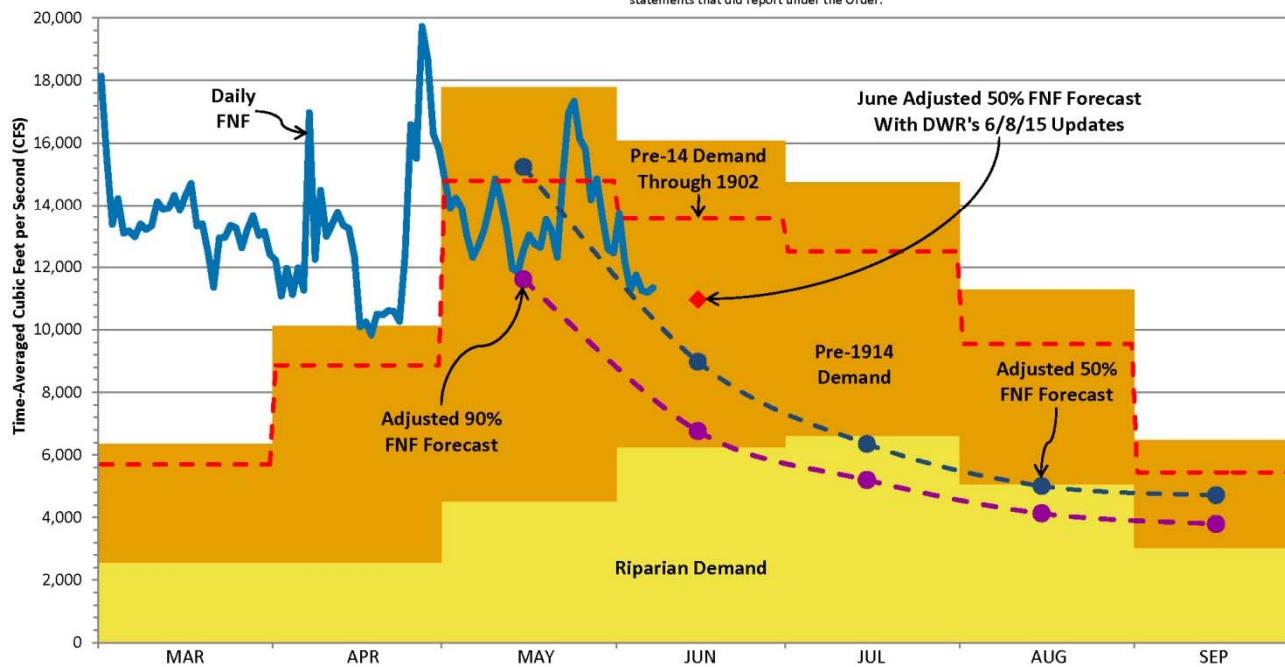
Daily Full Natural Flow (FNF) from CDEC Stations BND, ORO, YRS, FOL, TLG, MRC, GDW, MIL, MKM, and MHB, current through 6/7/2015.

Monthly Adjusted FNF Forecast points include DWR's May 2015 FNF Forecasts for BND, ORO, YRS, FOL, MIL, GDW, LGR, EXC, MHB, and PAR, and estimated FNF of minor streams for the 90% exceedance level. DWR does not provide 90% exceedance values for MHB and PAR; therefore, the available 50% exceedance values were added to the 90% exceedance forecast values. Minor stream FNFs were obtained from DWR's May 2007 Unimpaired Flow Data report, tables UF 1, UF 2, UF 3, UF 4, UF 5, UF 7, UF 10, and UF 17. Water year 1977 was used to reflect similarities in snowpack conditions.

Return flows were added to the 50% and 90% Adjusted FNF Forecast values as follows: For the San Joaquin Watershed, a percentage of the Riparian demand as used in the 1977 Drought Report (20% in April, 10% in May & June, and 0% in July, August, & September). For the Delta contribution, an assumed 40% of the prorated Riparian and Pre-14 demand was used as return flow.

Delta Riparian Demand includes Riparian-only and combination Riparian/Pre-14 demand for both statements reporting under the Informational Order and those not. Basin Riparian Demand includes Riparian-only and combination Riparian/Pre-14 demand for statements that did not report under the Order, and Riparian-only portion of the demand for statements that did report under the Order.

Delta Pre-14 Demand includes Pre-14-only demand. Basin Pre-14 Demand includes demand from Pre-14-only statements that did not report under the Informational Order, and Pre-14-only portion of the demand for statements that did report under the Order.



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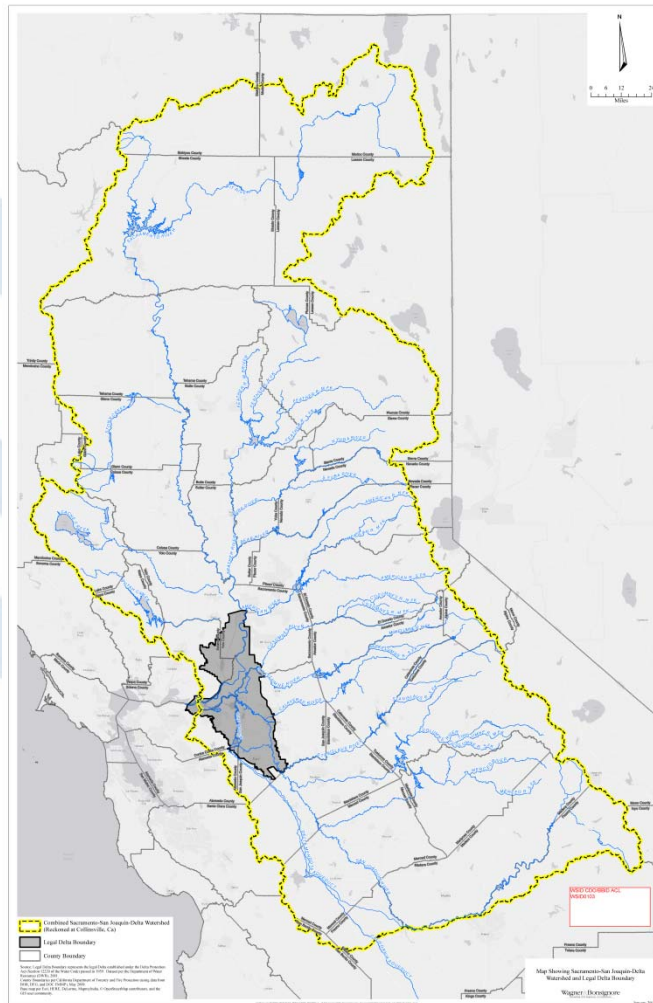
6/10/2015

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# Supply & Demand Analysis

- General Method
  - Identify Area of Interest (Management determined)
  - Define a Boundary
  - Compare water supplies to existing demands
  - Issue notices if demand exceeds supply
- Boundary Options
  - Global (Sacramento & San Joaquin Watershed)
  - Local (Sacramento River Watershed)
  - Tributary (Stanislaus River Watershed)
  - Sub-Tributary (HUC12 Level)

# Boundary Option – Global (WSID-103)

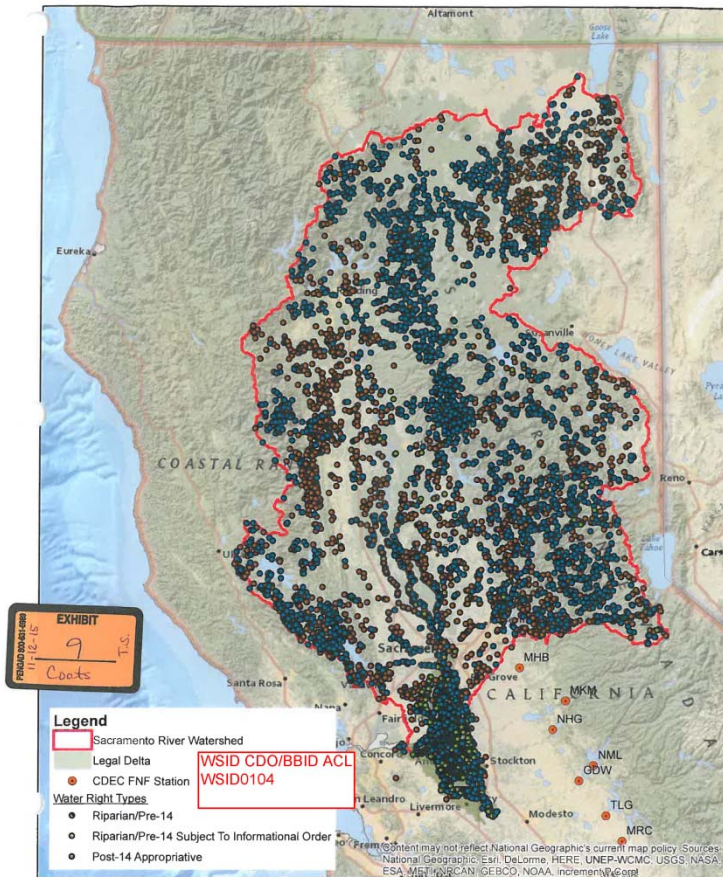


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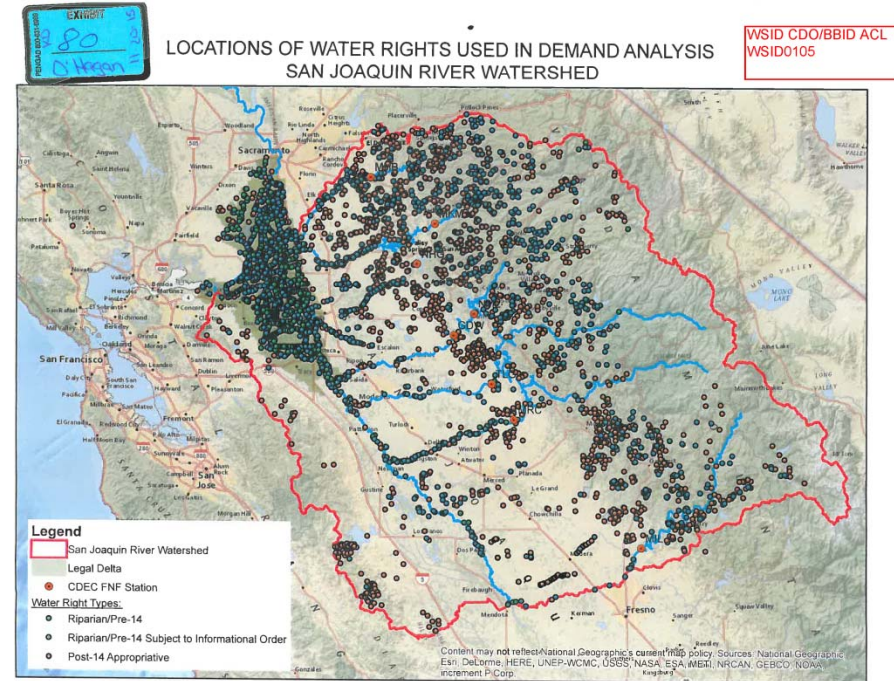
# Boundary Option – Local (WSID104,105)

LOCATIONS OF WATER RIGHTS USED IN DEMAND ANALYSIS  
SACRAMENTO RIVER WATERSHED



Date: 4/14/2015

LOCATIONS OF WATER RIGHTS USED IN DEMAND ANALYSIS  
SAN JOAQUIN RIVER WATERSHED



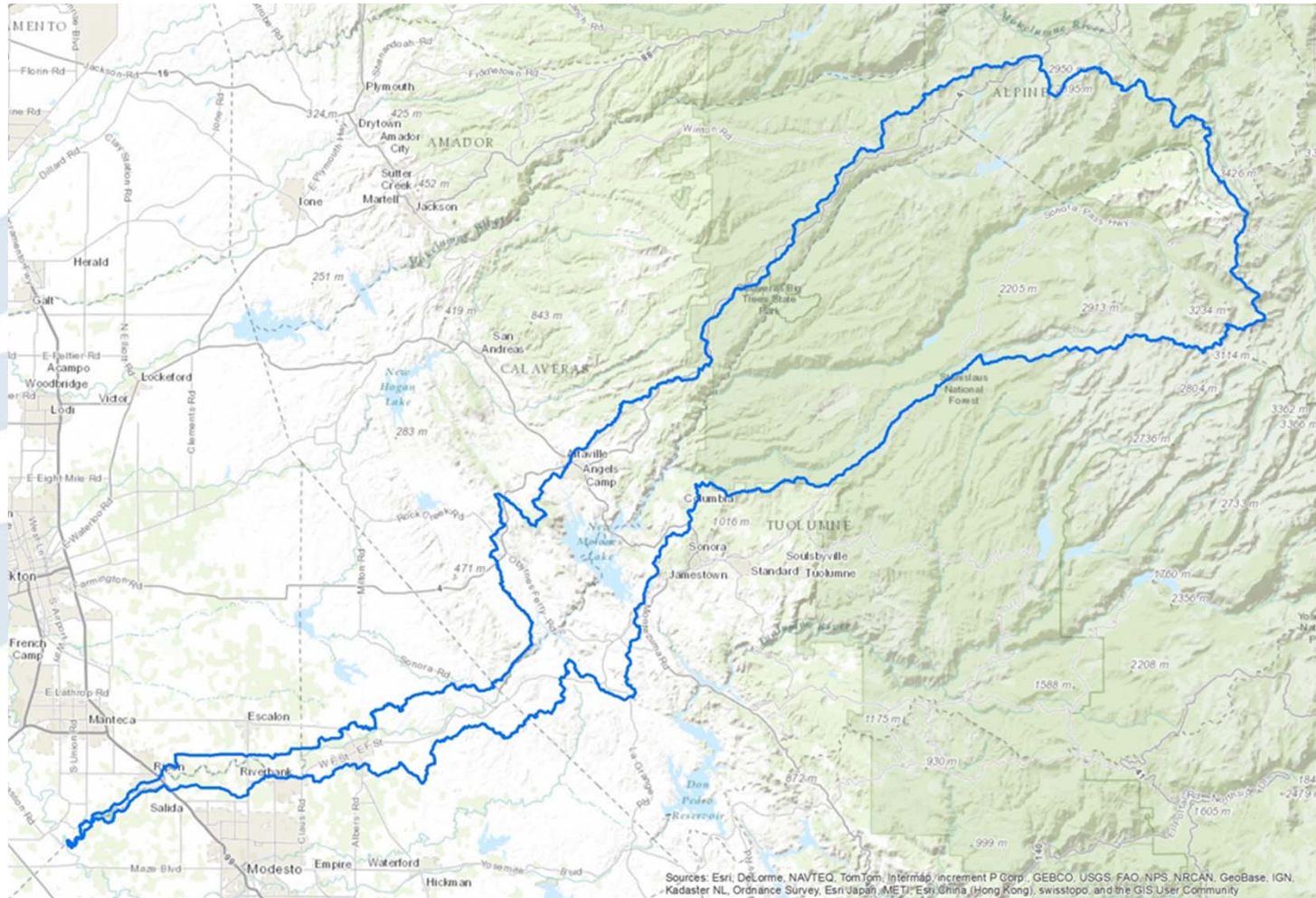
Date: 4/2/2015

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# Boundary Option – Tributary

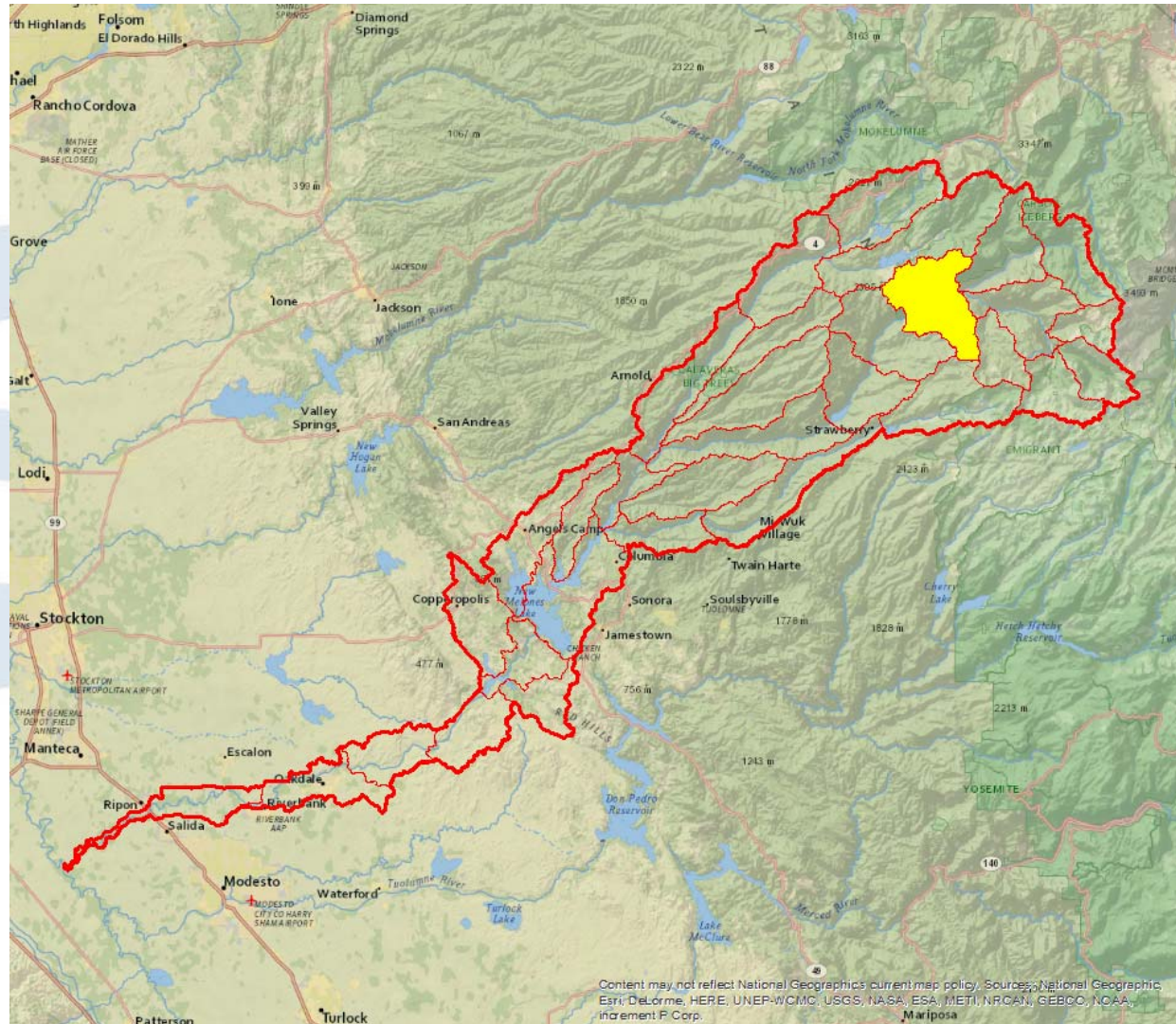
[http://www.waterboards.ca.gov/waterrights/water\\_issues/programs/drought/analysis/images/stanislaus\\_map.jpg](http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/analysis/images/stanislaus_map.jpg)



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# Boundary Option – HUC12



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# Choice of Boundary

- Depends on the distribution of high priority water rights and hydraulic connectivity
- Smaller boundaries chosen for cases with very low natural water supplies where natural depletions would absorb the flow prior to reaching higher-priority downstream users or when flows are hydraulically isolated (i.e. tributary level)
- Larger boundaries chosen when a high density distribution of senior priority rights exist at the most downstream point along with hydraulic connectivity (Sacramento River Local and San Joaquin River Local)
- Ideal boundary is as small as possible where natural flows are known and no competing claims to the water outside of the boundary.



# Boundary Selection Method

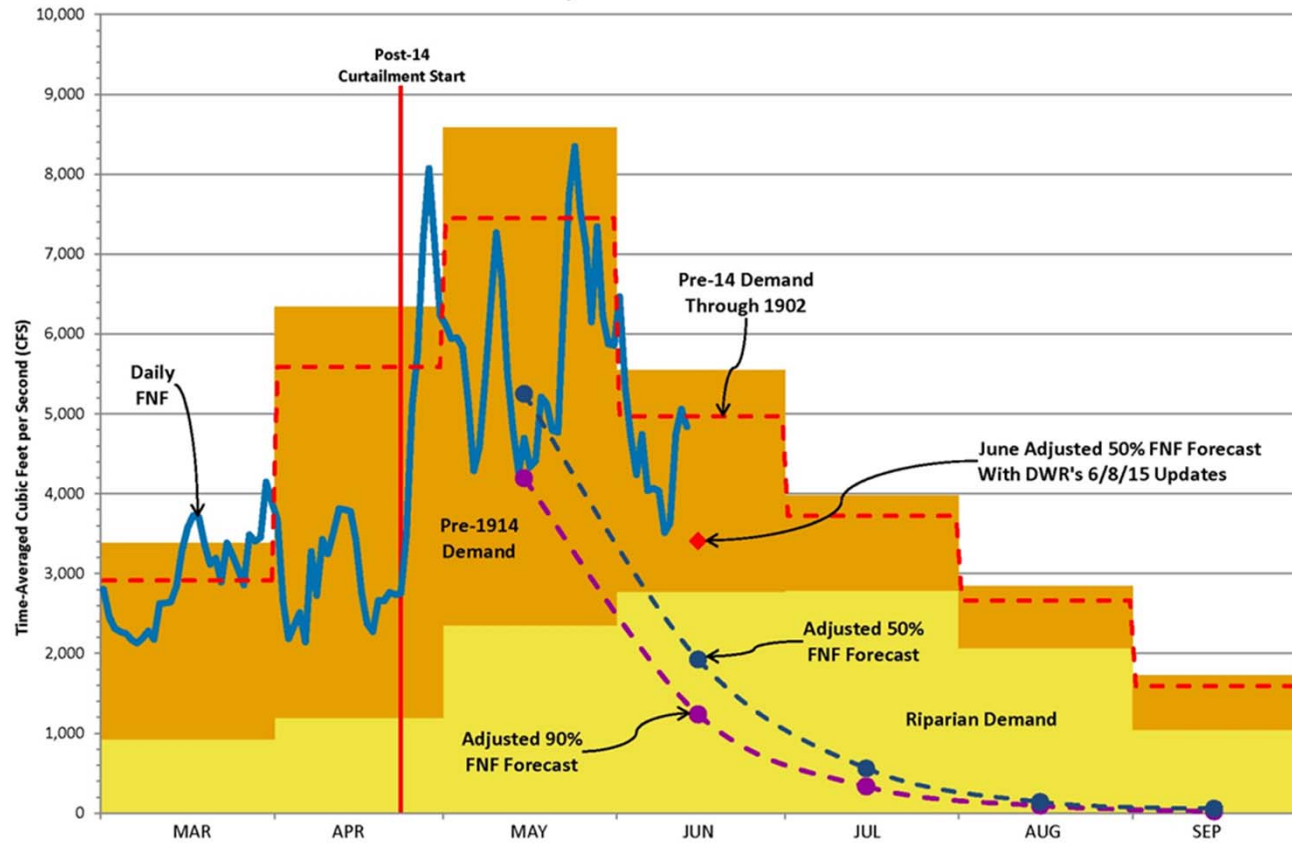
- WSID & BBID: both Points of Diversion are located within the South Delta.
- 2014 Allocation of Delta Demand – geography
- 2015 Allocation of Delta Demand - prorated supply
- For 2015, Division staff used an alternate boundary: entire Delta included in both the Sacramento and San Joaquin watersheds, but the associated Delta water use demands were parsed subject to how much monthly supply came from each river.
- Delta hydraulically connected to both the Sacramento and San Joaquin, so its fresh water demands were apportioned based on % of fresh water entering the Delta.
- For example, if during one month 80% of the fresh water entering the Delta comes from the Sacramento River, 80% of the Delta's demands should be assigned to the Sacramento River watershed.

# Boundary Selection

- May 1, 2015 Post-1914 notice (WSID): local Sacramento River boundary chosen for Delta diverters based on prorated supply of 71% for April.
- June 12, 2015 pre-1914 notice (BBID): global Sacramento and San Joaquin River boundary chosen after analyzing both local boundary options and choosing the more generous option for pre-1914 claims of right.
- BBID: Local boundary was also analyzed, but the results indicated a lack of water much earlier.

# June 2015 Local San Joaquin

2015 San Joaquin River Basin Senior Supply/Demand Analysis  
With Proportional Delta Demand



See following page for additional information.

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# June 2015 Global Boundary

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## 2015 Combined Sacramento/San Joaquin River Basin Senior Supply/Demand

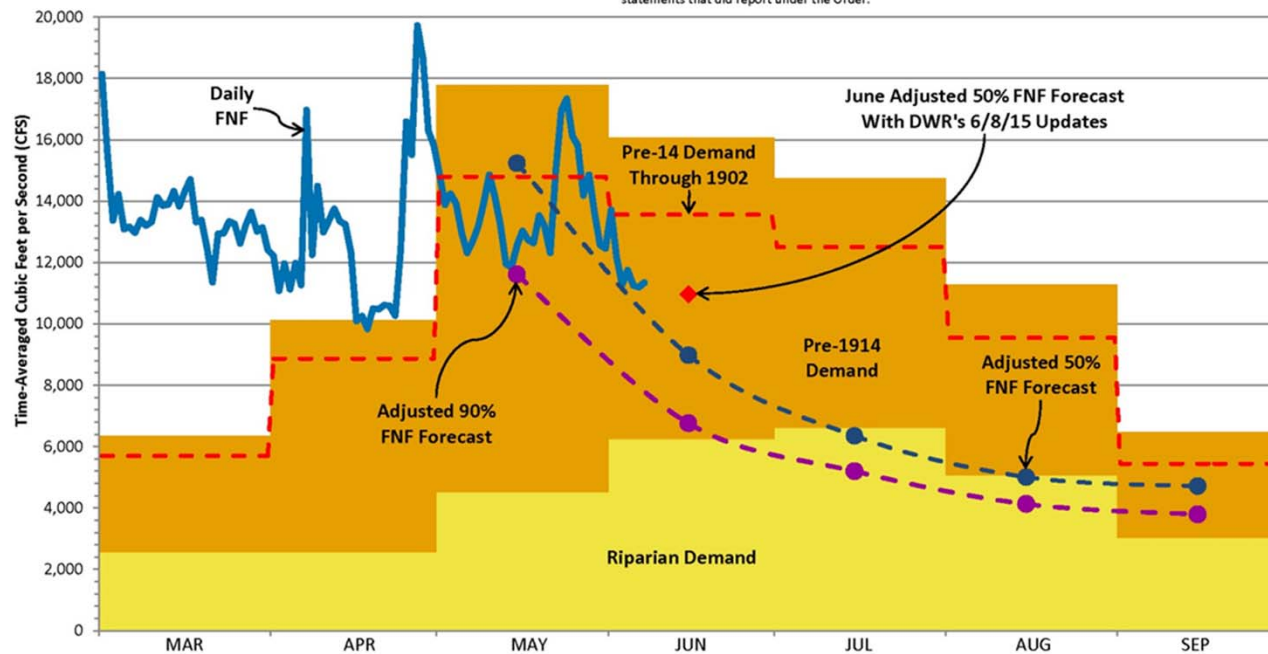
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# Boundary Selection Summary

- **WSID:** Even though located in the South Delta, the watershed boundaries relevant to the supply-demand analysis for its priority of right were based on the Sacramento River because there were meager fresh water supplies available from the San Joaquin.
- **BBID:** Combined Sacramento and San Joaquin watershed because a separate San Joaquin River only analysis would have resulted in much deeper and earlier cuts.
- Therefore, selections made to benefit diverters.

# Supply Stations

- Supply data: Full Natural Flow (FNF) from DWR Bulletin 120 forecasts.
- DWR publishes annually: February to May (Testimony of Steven E. Nemeth).
- Include data for the FNF stations that provide the largest impact to a river's natural supplies.
- May 1 Notice (WSID): stations included Sacramento River at Bend Bridge, Feather River at Oroville, Yuba River at Smartville and the American River at Folsom.
- June 12 Notice (BBID): addition of Stanislaus, Tuolumne, Merced, Upper San Joaquin, Mokelumne and Consumnes River to compliment Sacramento River sources.

# Supply Data: Exceedance Forecasts

- B120 forecast provides monthly water supply probability for certain watersheds.
- Statistical probabilities in form of exceedance % based on current snowpack and other data (Testimony of Steven E. Nemeth).
- Predicts how much full natural or unimpaired water is expected to be available upstream of the referenced location for the rest of the water year (October 1—September 30).
- Downstream sources and depletions not reported.

# Sample B120 Report

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## 2015 SAN JOAQUIN RIVER WATER YEAR FORECAST BREAKDOWN May 1, 2015

Stanislaus River below Goodwin Reservoir Unimpaired Flow [taf]														WY	Apr-Jul	WY % of avg
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep				
99%	7	9	35	13	91	38	37	20	5	0	0	0	255	62	25%	
90%	7	9	35	13	91	38	37	26	7	0	0	0	265	70		
75%	7	9	35	13	91	38	37	36	9	0	0	0	275	82		
50%	7	9	35	13	91	38	37	47	11	0	0	0	290	95		
25%	7	9	35	13	91	38	37	85	23	4	1	2	325	129		
10%	7	9	35	13	91	38	37	82	34	7	3	4	360	160		
1961-2010 avg													1,167	699		
Tuolumne River below La Grange Reservoir Unimpaired Flow [taf]														WY	Apr-Jul	WY % of avg
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep				
99%	3	9	69	25	114	57	85	61	5	2	0	0	430	153	27%	
90%	3	9	69	25	114	57	85	90	10	5	0	0	465	190		
75%	3	9	69	25	114	57	85	103	23	7	0	0	495	218		
50%	3	9	69	25	114	57	85	110	35	10	0	0	515	240		
25%	3	9	69	25	114	57	85	120	50	14	2	2	550	269		
10%	3	9	69	25	114	57	85	131	66	18	4	3	585	300		
1961-2010 avg													1,943	1,221		
Merced River below Merced Falls Unimpaired Flow (below Lake McClure) [taf]														WY	Apr-Jly	WY % of avg
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep				
99%	0	3	13	7	25	20	30	14	4	1	0	0	115	49	15%	
90%	0	3	13	7	25	20	30	25	8	2	0	0	130	65		
75%	0	3	13	7	25	20	30	31	10	3	0	0	140	74		
50%	0	3	13	7	25	20	30	39	12	4	0	0	150	85		
25%	0	3	13	7	25	20	30	55	21	6	2	0	180	112		
10%	0	3	13	7	25	20	30	70	30	10	3	1	210	140		
1961-2010 avg													1,007	636		
San Joaquin River inflow to Millerton Lake Unimpaired Flow [taf]														WY	Apr-Jly	WY % of avg
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep				
99%	3	9	21	14	42	34	39	32	14	4	2	0	215	89	14%	
90%	3	9	21	14	42	34	39	41	18	7	4	1	235	105		
75%	3	9	21	14	42	34	39	46	22	12	5	2	250	119		
50%	3	9	21	14	42	34	39	51	26	14	7	3	265	130		
25%	3	9	21	14	42	34	39	71	42	18	10	6	310	170		
10%	3	9	21	14	42	34	39	91	58	22	12	9	355	210		
1961-2010 avg													1,831	1,258		
Sum of above Unimpaired Flows in San Joaquin River Tributaries [taf]														WY	Apr-Jly	WY % of avg
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep				
99%	13	30	138	59	272	148	191	127	28	7	2	0	1,015	353	21%	
90%	13	30	138	59	272	148	191	182	43	14	4	1	1,095	431		
75%	13	30	138	59	272	148	191	216	64	22	5	2	1,160	493		
50%	13	30	138	59	272	148	191	247	84	28	7	3	1,220	550		
25%	13	30	138	59	272	148	191	311	136	42	15	9	1,365	680		
10%	13	30	138	59	272	148	191	374	188	57	22	18	1,510	810		
1961-2010 avg													5,948	3,814		
Eight River Index [taf]														WY	Apr-Jly	WY % of avg
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep				
99%	363	463	2906	805	2228	841	766	425	217	164	144	137	9,460	1,572	40%	
90%	363	463	2906	805	2228	841	766	544	265	200	163	160	9,705	1,776		
75%	363	463	2906	805	2228	841	766	657	331	231	193	189	9,975	1,985		
50%	363	463	2906	805	2228	841	766	767	397	270	217	215	10,240	2,201		
25%	363	463	2906	805	2228	841	766	957	520	324	256	249	10,680	2,567		
10%	363	463	2906	805	2228	841	766	1149	636	380	296	286	11,120	2,931		
1961-2010 avg													24,211	10,284		
Previous Month 8 River Index							Apr	766 taf								

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San Joaquin River Forecast 5/8/2015 2:38 PM

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# Monthly versus Daily FNF

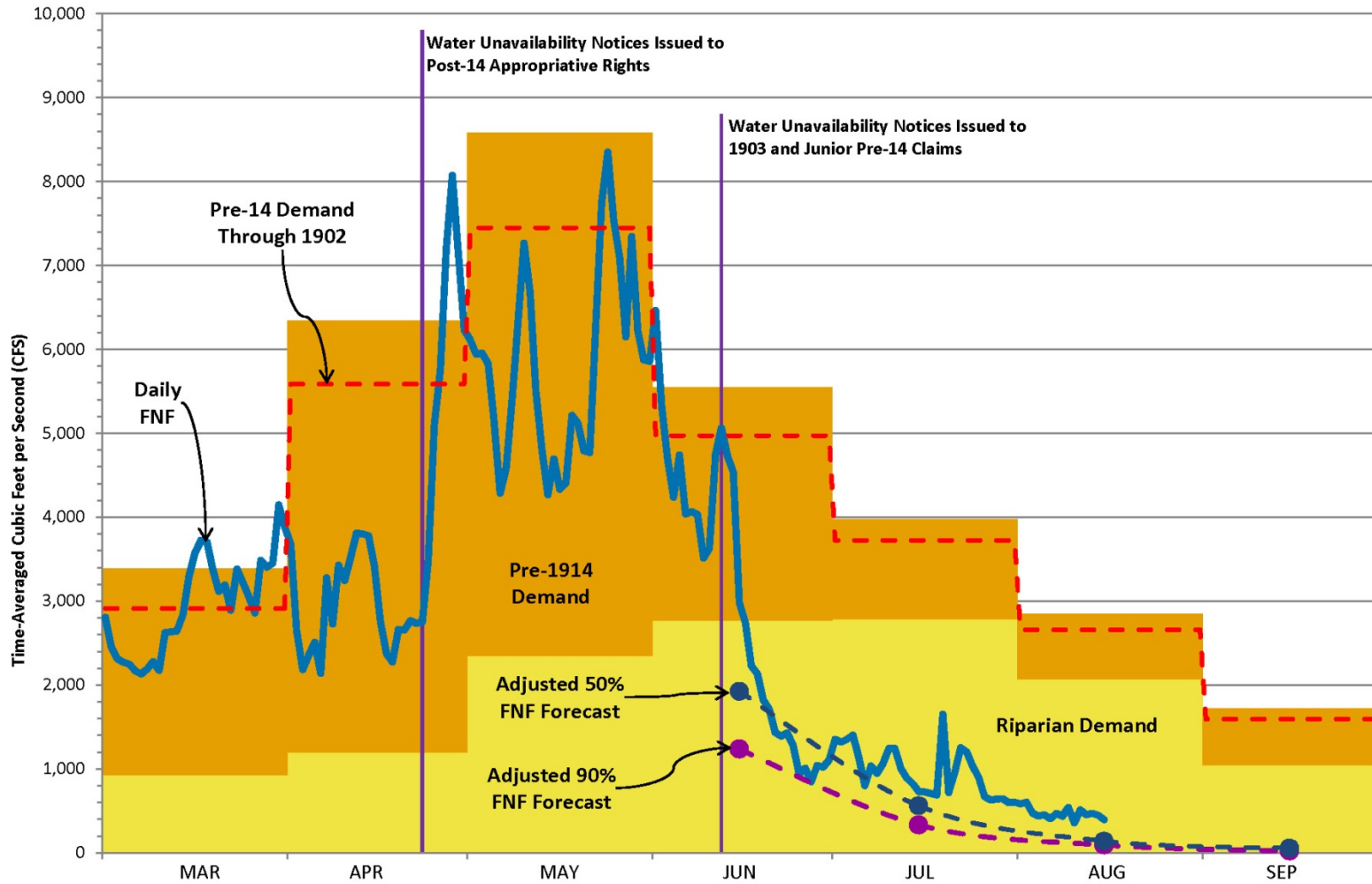
- Monthly FNF data is based on actual historical data and current snowpack conditions.
- Daily FNF data is a calculation, performed by DWR, which uses current stream gage values, known upstream diversions and reservoir data such as changes in storage, to arrive at the amount of available water for that day. (Testimony of Steven E. Nemeth)
- Daily FNF was used in two ways:
  - (1) to verify the monthly B120 forecasts; and
  - (2) “backup” supply if daily averaged monthly B120 is < daily.
- Division staff made every assumption in favor of the diverters.

# Monthly versus Daily FNF

- For the San Joaquin tributary analysis in the summer of 2015, the May 2015 B120 Monthly Forecast for three rivers in August and September was zero for the 50% - 99% exceedance percentages.
- But the Daily FNF, while low, was  $>$  zero for some days so we used the daily FNF trend as a supply estimate.
- In the next graph, a supply and demand graph for the San Joaquin River prepared in August 2015, we see the blue daily FNF line above the B120 supply forecast for July and August.
- Since the daily FNF is slightly positive, we used that daily FNF data in our monitoring since even a small positive supply is better than zero.

WR-109 (May 2015 B120) at p. 4.

## 2015 San Joaquin River Basin Senior Supply/Demand Analysis With Proportional Delta Demand



See following page for additional information.

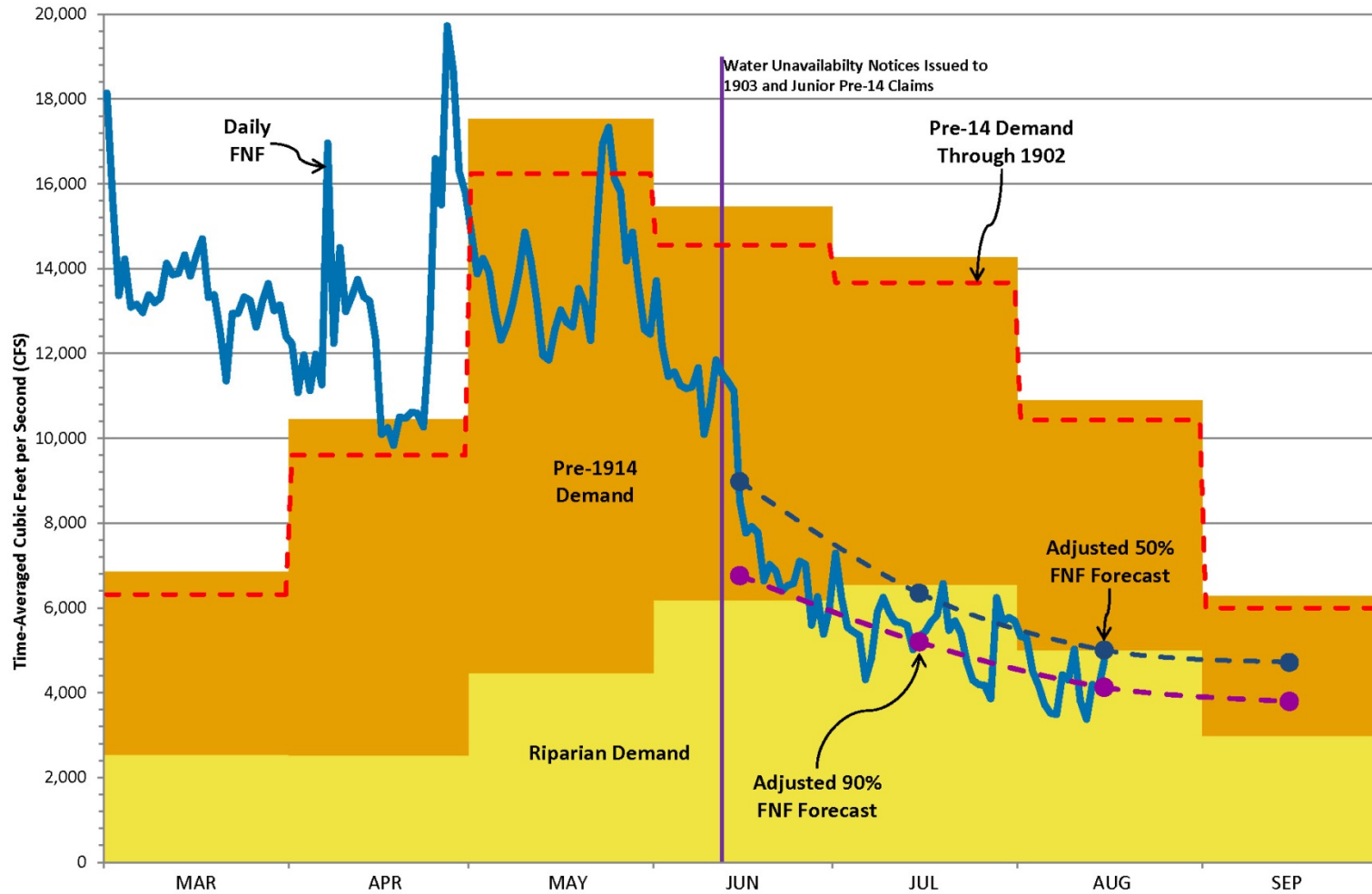
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### 2015 Combined Sacramento/San Joaquin River Basin Senior Supply/Demand Analysis



See following page for additional information.

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# Supply Adjustments Return Flows & Valley Floor

- Delta diverters often pump lower quality water off of their parcel into the channel while at the same time diverting higher quality water from the channel onto their land.
- As a result, diverters may use a smaller net quantity of water for irrigation as compared to actual amount diverted.
- Addressed by adjusting supply and/or demand estimates within the Delta.

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# San Joaquin & Delta Stakeholder Input

- Division staff met with San Joaquin and Delta stakeholders on May 12, 2015 to discuss return flows and additional supply sources to be considered.
- Stakeholders indicated that applying a 40% reduction to the reported irrigation demand for the Delta would be appropriate to address actual net irrigation demand.
- Division staff applied this 40% demand reduction by either increasing the available supply, through an adjustment, or by reducing the reported demand.

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# Supply Additions

## 1977 Dry Year Report

- Addition of return flows from the Valley Floor.
- Return flows: irrigation runoff returned to stream system.
- Page 6 of Appendix to 1977 report specifies varying % by month of return flow for the San Joaquin River watershed.
- Did not allocate return flows for the Sacramento River.

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# More Supply Additions California Central Valley

- Additional supply was also added for smaller tributaries.
- DWR's Bay Delta Office 2007 report titled, "California Central Valley – Unimpaired Flow Data."
- Provides FNF for a variety of water year types.
- Due to snowpack levels in 2015 being the lowest on record, Division staff opted to choose 1977 FNF values for the areas to best represent a 2015 estimate, since the 1977 snowpack was the next worse year relative to 2015.

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# Watershed Supply Summary

- FNF station values + return flow for Delta & Valley Floor = monthly total in acre-feet.
- Converted to average daily cubic feet per second.
- Then, convert monthly total in acre-feet into a daily rate so that the daily FNFs can be charted on the same time step.
- For example, June data for the San Joaquin River watershed.
- First row: Total B120 supply forecast for the 6 FNF stations listed.
- Second row: Expected return flows producing total of 1,924 cfs.

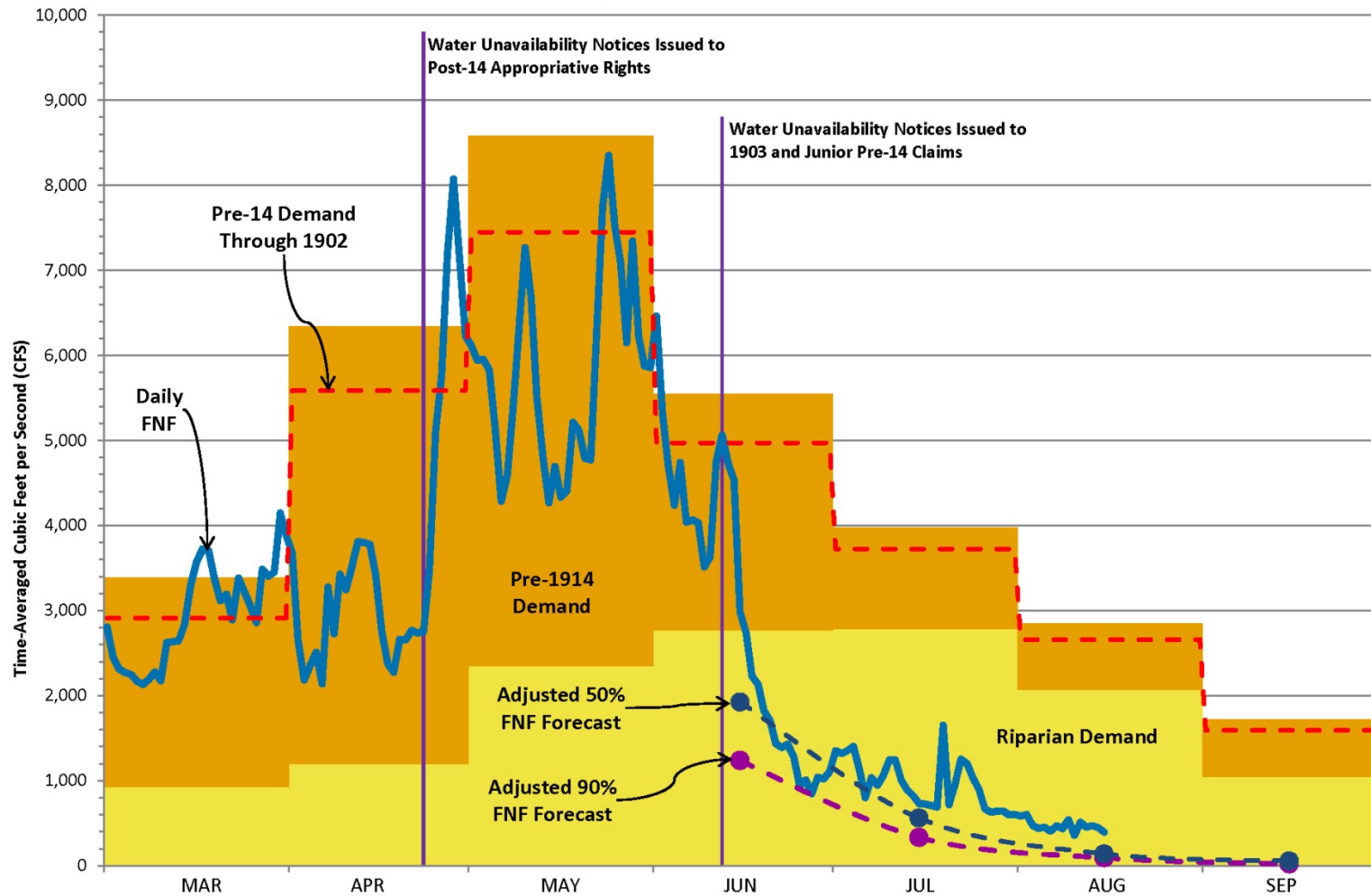
FNF FORECAST ADJUSTMENT (CFS)		
	June	Reference
CDEC 50% Exceedance FNF Forecast	1,462	Sum of GDW, LGR, EXC, MHB, TLG, and MIL
Return Flow	462	
<b>Adjusted 50% Exceedance FNF Forecast</b>	<b>1,924</b>	

WR-109

March 21-25, 28-30,  
April 1, 4, 6, 2016

WR-253  
41

## 2015 San Joaquin River Basin Senior Supply/Demand Analysis With Proportional Delta Demand



See following page for additional information.

8/19/2015

WR-78

March 21-25, 28-30,  
April 1, 4, 6, 2016

WR-253  
42

# Demand Data & Reporting

- Division relied upon the water right users themselves.
- Required to submit information accurately and to best of knowledge.
- Required to submit actual monthly use online every 1-3 years.
- 3-Year Reporting Cycle: Riparian and Pre-1914 users.
- A third of pre-1914 & riparian users had 3-years of use ending in one year, the next third a year later and so on.
- For example, BBID's 2010-2012 reported use: WR-85 through WR-87, but BBID will not need to report its 2013-2015 use until 2016.

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43

# Demand Data

## 2014 versus 2015

- During 2014 drought, most recent complete reported demand was used.
- Due to triennial reporting, in 2014 the Division only had a complete record of demand for all riparian and pre-1914 water rights for the 2010 year.
- For 2015, the Division used a four-year average (years 2010-2013 or whatever years in 2010-2013 range that were available) to best represent projected demand for 2015.

# Informational Order

- Issued in February 2015 to largest water users in the Sacramento River, San Joaquin River and Sacramento-San Joaquin Delta.
- Required top 90% of riparian and pre-1914 water users to provide 2014 demand by July 1, 2015, and projected 2015 demand by March 6, 2015.
- Also required monthly reporting of 2015 use, due early the month following any diversions, as a check against use of 2014 data.

WR-30

March 21-25, 28-30,  
April 1, 4, 6, 2016

WR-253  
45

# Informational Order Demand Calculations

- For Order recipients, 4-year average demand was replaced by reported 2014 demand.
- For those not subject to the Order, demand was represented by the 4-year average.
- WSID: since they hold a license, used 2010-2013 average demand.
- BBID: being a recipient of the Order, submitted 2014 actual use and 2015 projected use.

WR-30

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April 1, 4, 6, 2016

WR-253  
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# BBID Response to Informational Order

- Summary prepared by BBID in response to Order.
- BBID's 2014 actual use by month with an estimate for their projected 2015 use.

WR-88

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April 1, 4, 6, 2016

WR-253  
47

# Demand Data

## Riparian & Pre-1914

- For the Legal Delta, where BBID and WSID are located, special consideration was given to those claiming both a riparian and pre-1914 water right.
- These stakeholders advised that in the event a pre-1914 notice of unavailability was issued, they would “roll over” their pre-1914 amount into the more senior riparian right.
- Division staff therefore assigned all reported demand as riparian for those that reported use under both a riparian and pre-1914 water right within the Delta.



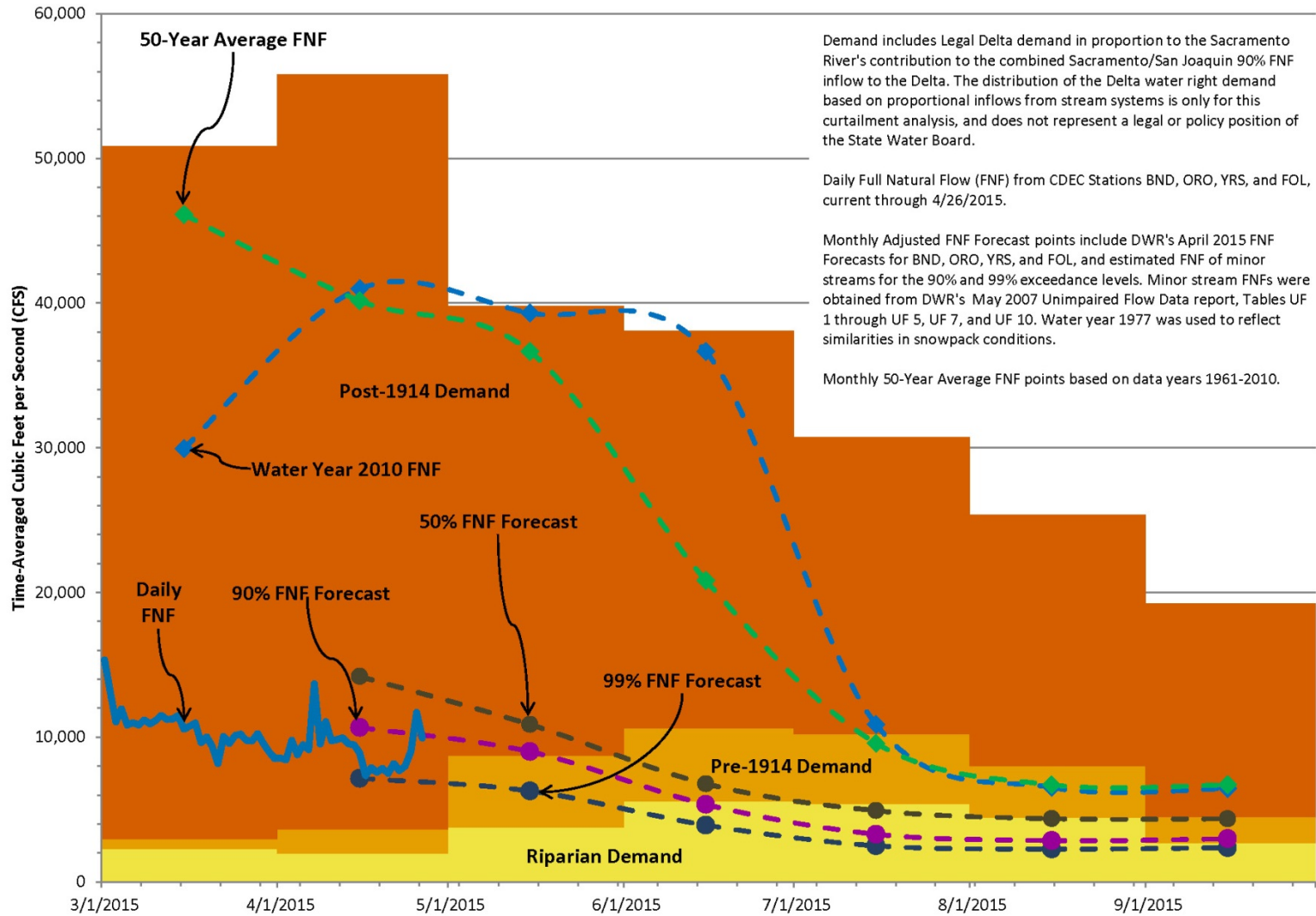
# Demand Data Quality Control

- Jeffrey Yeazell's testimony.
- Demand data posted to internet for public to comment on and correct the data.
- Outside comments on 2014 reported use data for the top 90% of riparian and pre-1914 demand, and 2010 to 2013 4-year average demand for the remaining diverters.

# Delta Demand: Pro-Rated

- Delta is hydraulically connected to both Sacramento and San Joaquin Rivers.
- Each supplies a different amount of water to the Delta.
- Division staff allocated a proportion of total Delta demand to both rivers based on respective supplies to Delta.
- Proposal accepted by San Joaquin stakeholders on May 12, 2015 because it would reduce their Delta demand allocation and allow them to divert for longer.

## 2015 Sacramento River Basin Supply/Demand



Demand includes Legal Delta demand in proportion to the Sacramento River's contribution to the combined Sacramento/San Joaquin 90% FNF inflow to the Delta. The distribution of the Delta water right demand based on proportional inflows from stream systems is only for this curtailment analysis, and does not represent a legal or policy position of the State Water Board.

Daily Full Natural Flow (FNF) from CDEC Stations BND, ORO, YRS, and FOL, current through 4/26/2015.

Monthly Adjusted FNF Forecast points include DWR's April 2015 FNF Forecasts for BND, ORO, YRS, and FOL, and estimated FNF of minor streams for the 90% and 99% exceedance levels. Minor stream FNFs were obtained from DWR's May 2007 Unimpaired Flow Data report, Tables UF 1 through UF 5, UF 7, and UF 10. Water year 1977 was used to reflect similarities in snowpack conditions.

Monthly 50-Year Average FNF points based on data years 1961-2010.

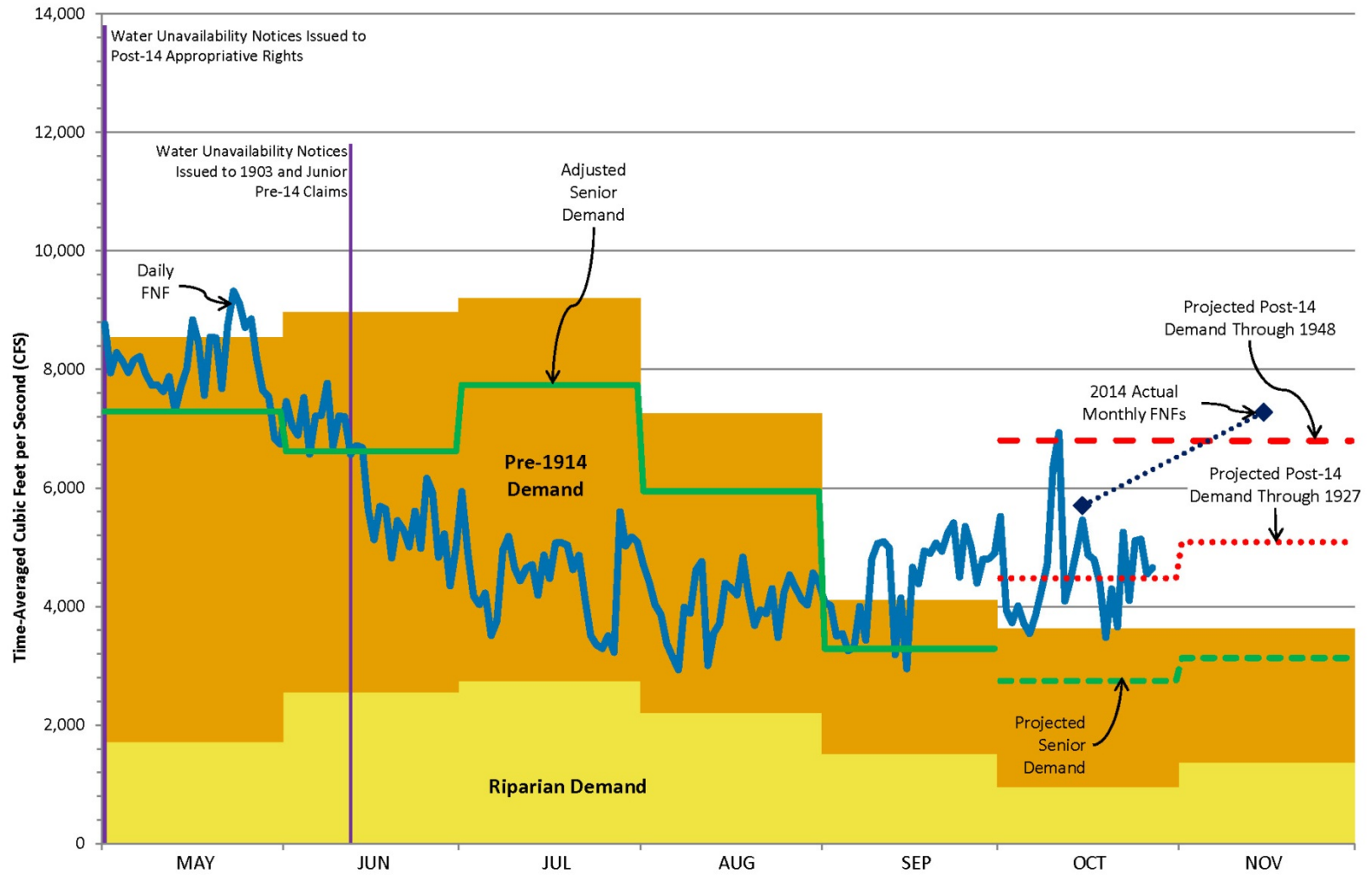
WR-47

4/29/2015

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WR-253  
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## 2015 Sacramento River Basin Supply/Demand Analysis with Proportional Delta Demand



See following page for additional information.

WR-54

10/30/2015

March 21-25, 28-30,  
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## 2015 Combined Sacramento/San Joaquin River Basin Senior Supply/Demand

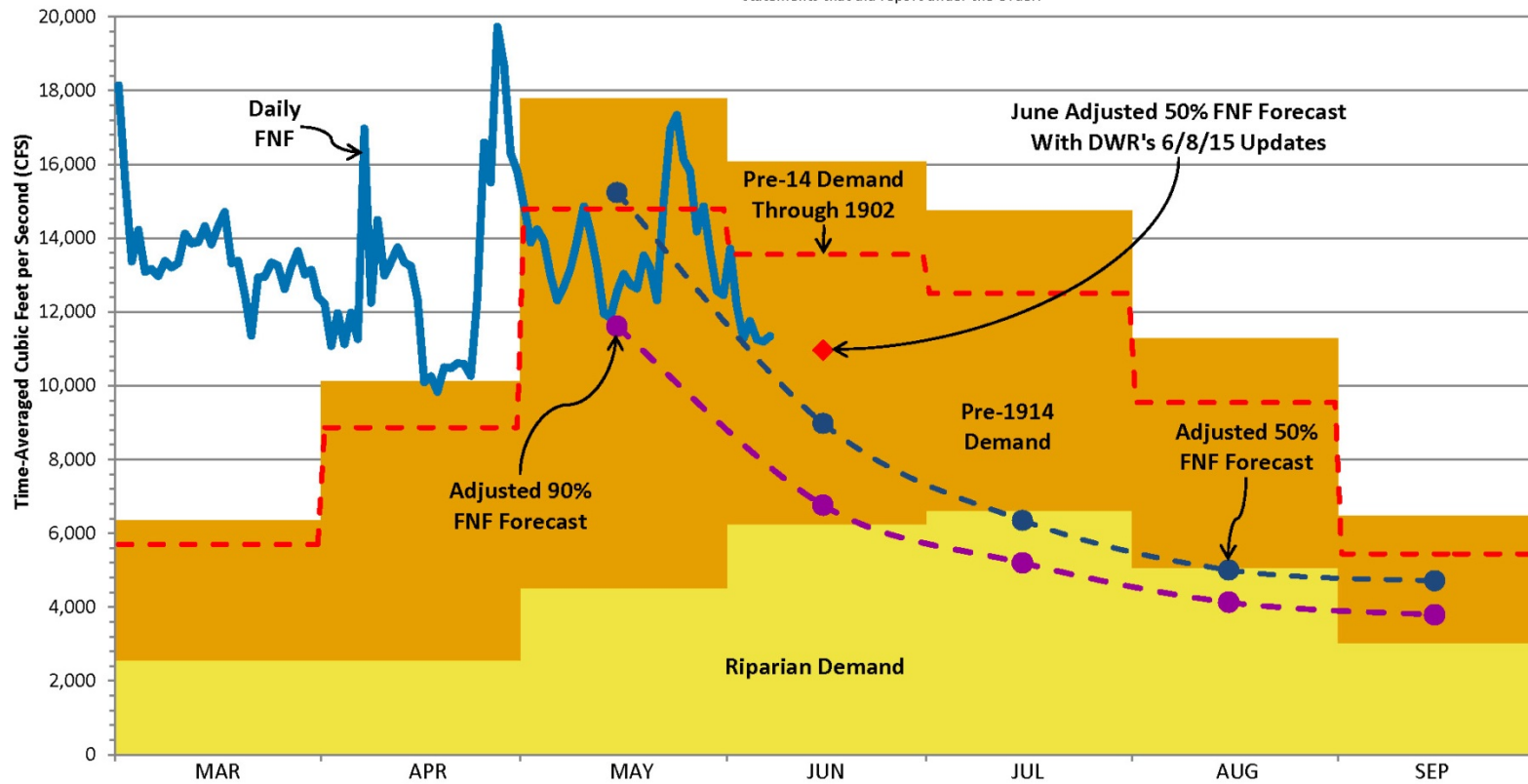
Daily Full Natural Flow (FNF) from CDEC Stations BND, ORO, YRS, FOL, TLG, MRC, GDW, MIL, MKM, and MHB, current through 6/7/2015.

Monthly Adjusted FNF Forecast points include DWR's May 2015 FNF Forecasts for BND, ORO, YRS, FOL, MIL, GDW, LGR, EXC, MHB, and PAR, and estimated FNF of minor streams for the 90% exceedance level. DWR does not provide 90% exceedance values for MHB and PAR; therefore, the available 50% exceedance values were added to the 90% exceedance forecast values. Minor stream FNFs were obtained from DWR's May 2007 Unimpaired Flow Data report, tables UF 1, UF 2, UF 3, UF 4, UF 5, UF 7, UF 10, and UF 17. Water year 1977 was used to reflect similarities in snowpack conditions.

Return flows were added to the 50% and 90% Adjusted FNF Forecast values as follows: For the San Joaquin Watershed, a percentage of the Riparian demand as used in the 1977 Drought Report (20% in April, 10% in May & June, and 0% in July, August, & September). For the Delta contribution, an assumed 40% of the prorated Riparian and Pre-14 demand was used as return flow.

Delta Riparian Demand includes Riparian-only and combination Riparian/Pre-14 demand for both statements reporting under the Informational Order and those not. Basin Riparian Demand includes Riparian-only and combination Riparian/Pre-14 demand for statements that did not report under the Order, and Riparian-only portion of the demand for statements that did report under the Order.

Delta Pre-14 Demand includes Pre-14-only demand. Basin Pre-14 Demand includes demand from Pre-14-only statements that did not report under the Informational Order, and Pre-14-only portion of the demand for statements that did report under the Order.



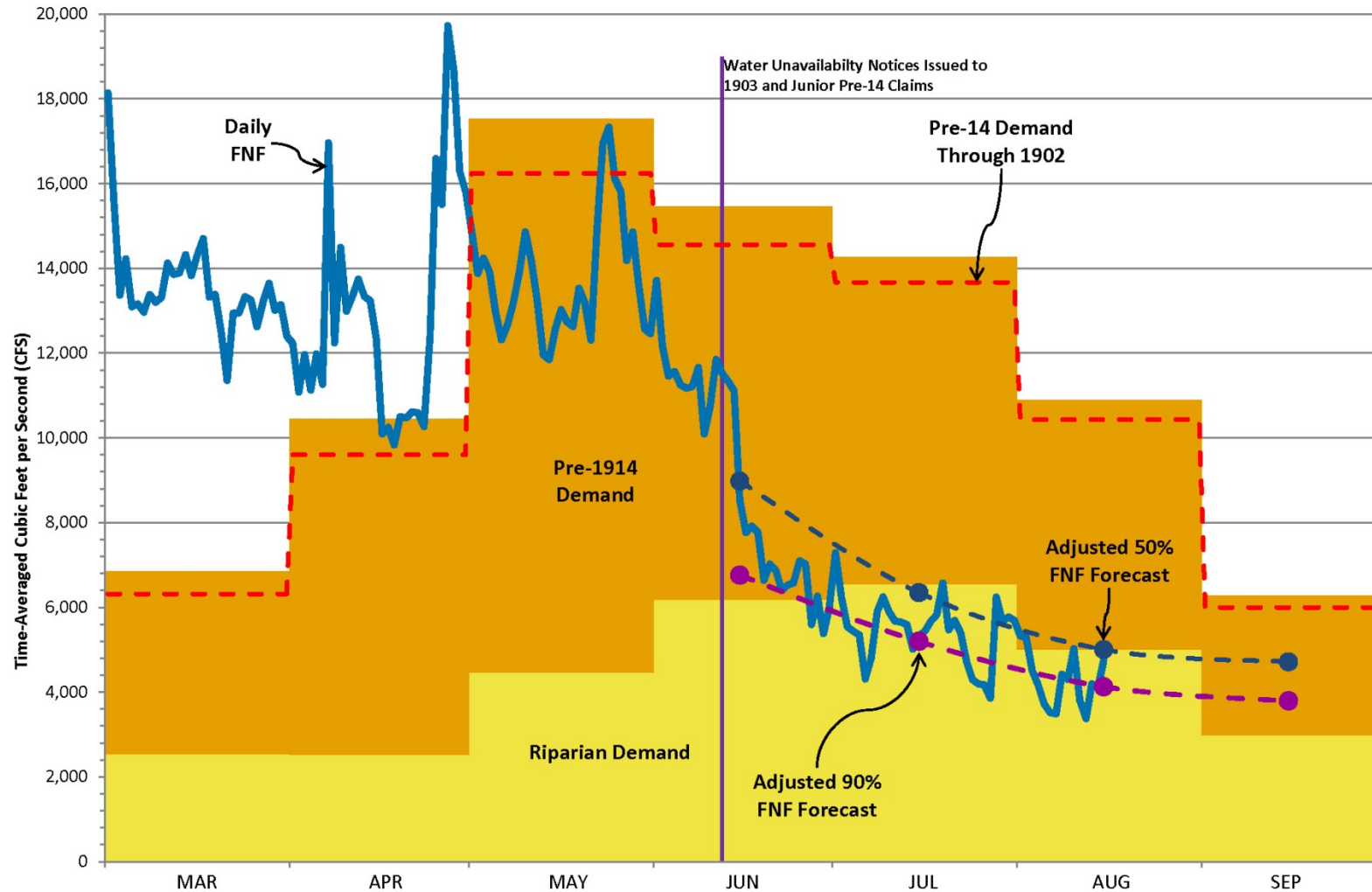
WR-48

6/10/2015

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WR-253  
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### 2015 Combined Sacramento/San Joaquin River Basin Senior Supply/Demand Analysis



See following page for additional information.

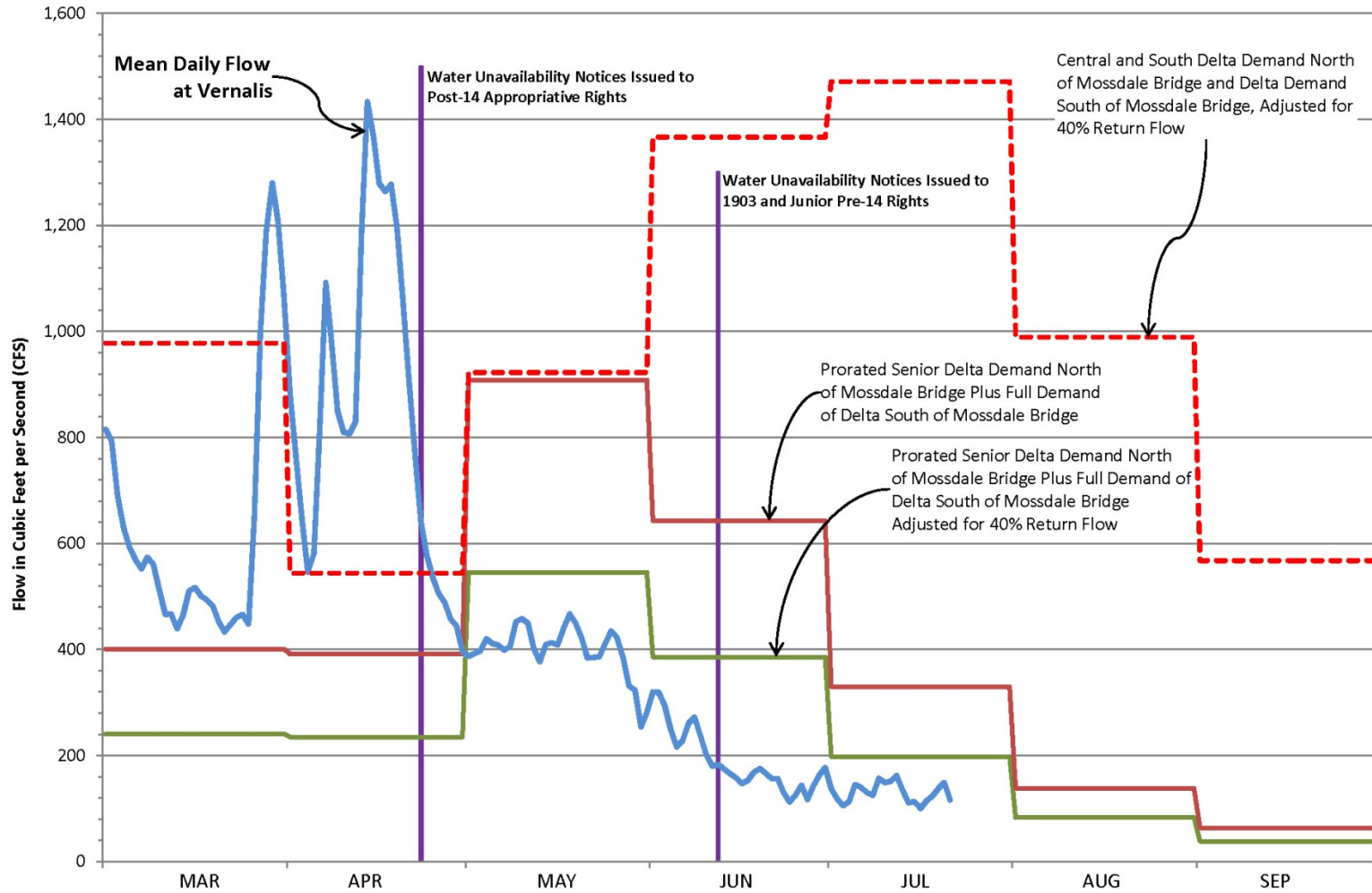
WR-52

8/19/2015

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### 2015 Delta Demand Analysis Senior Demand Having 1902 and Prior Claims



10/7/2015

WR-81

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WR-253  
55

# Phase 1 Testimony: Jeffrey Yeazell, P.E.

- Water Resource Control Engineer with State Water Board's Division of Water Rights
- B.S. in Environmental Resources Engineering from Humboldt State University (1992)
- Registered Professional Engineer in California

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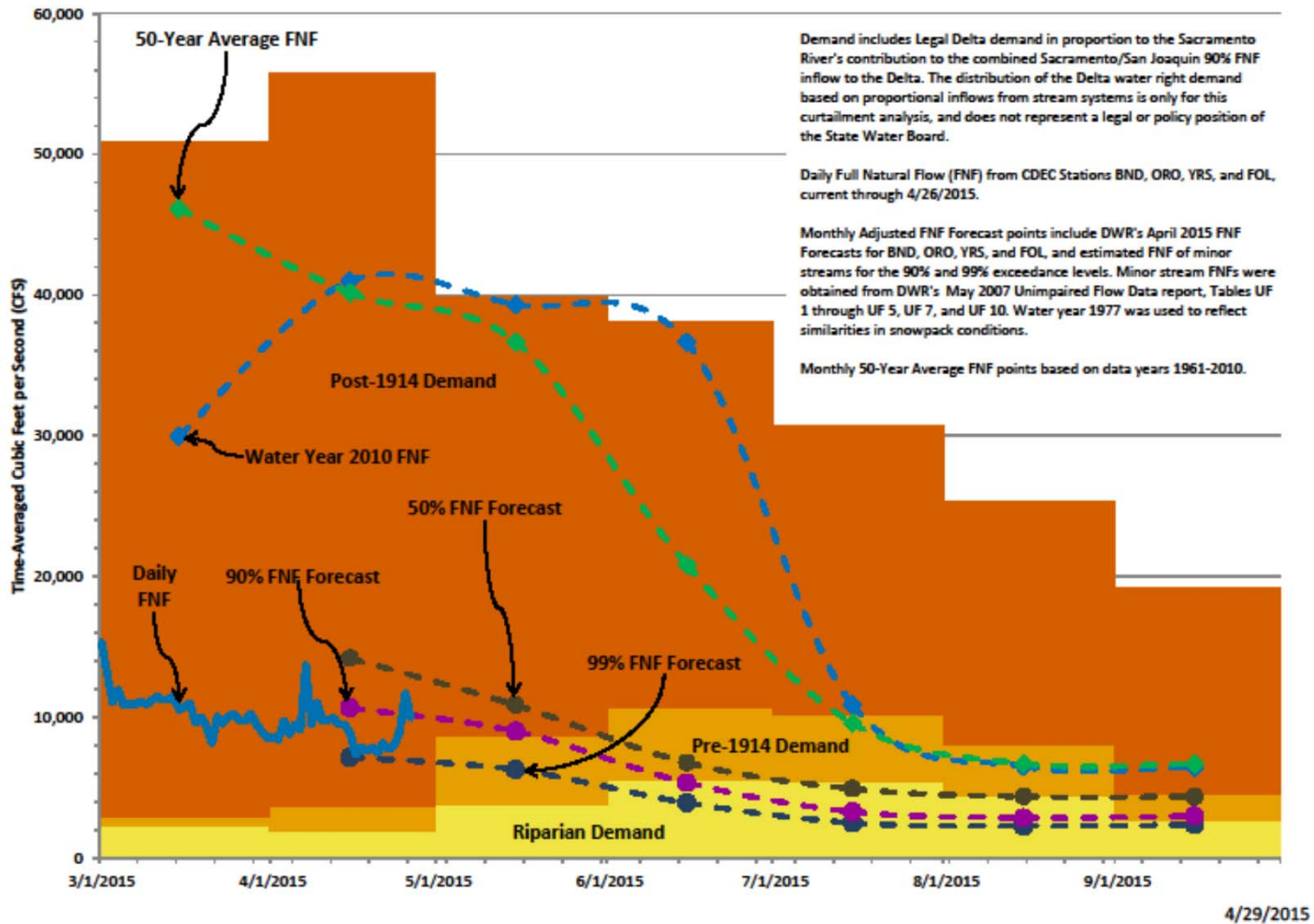
# Purpose of Testimony

- Since August 2013, primary duties have included compiling, organizing, and maintaining water supply and demand data for purposes of conducting water availability analyses.
- Produced graphs comparing water supply to relevant demand in various watersheds.
- Testimony focuses on how the water availability graphs were generated.

# Conditions at Time of 5/1/15 Unavailability Notice

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Page 1

## 2015 Sacramento River Basin Supply/Demand



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# Conditions at Time of 6/12/15 Unavailability Notice

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Page 1

## 2015 Combined Sacramento/San Joaquin River Basin Senior Supply/Demand

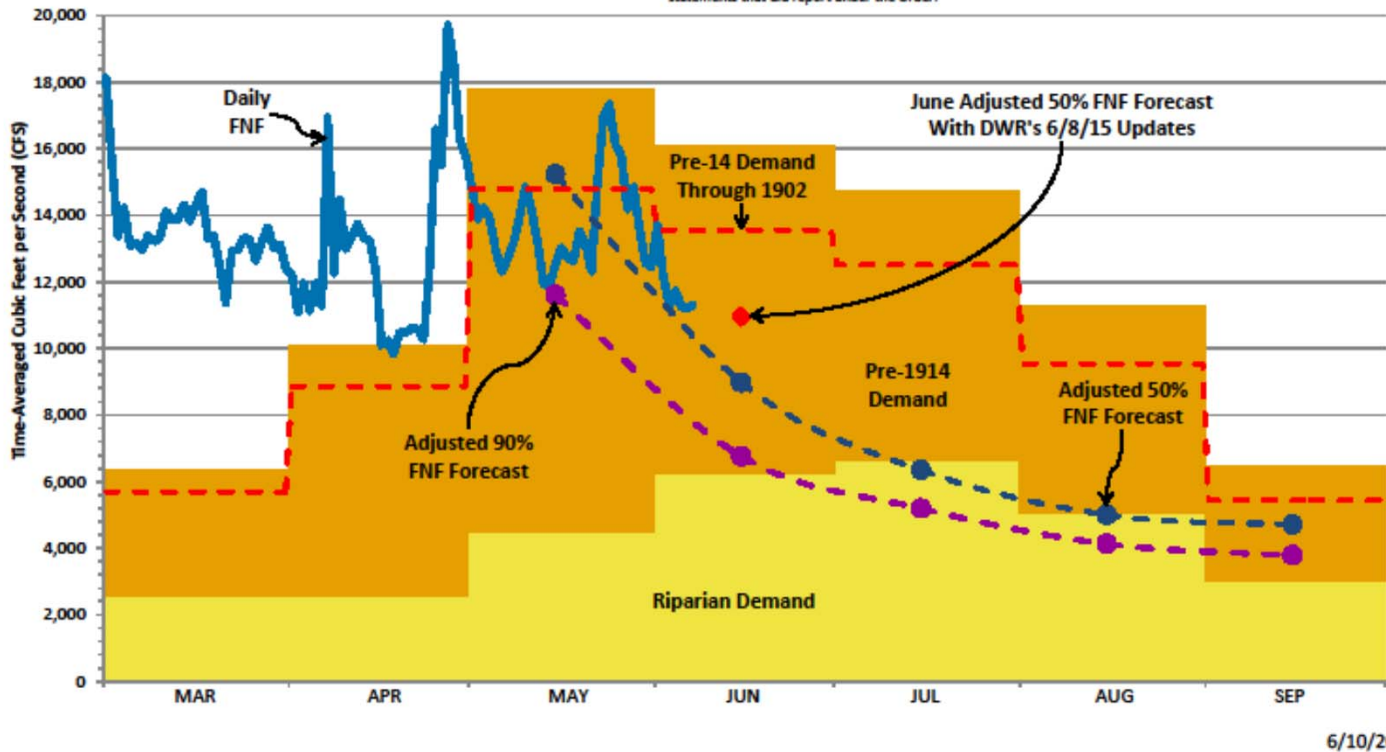
Daily Full Natural Flow (FNF) from CDEC Stations BND, ORD, YRS, FOL, TLG, MRC, GDW, MIL, MKM, and MHB, current through 6/7/2015.

Monthly Adjusted FNF Forecast points include DWR's May 2015 FNF Forecasts for BND, ORD, YRS, FOL, MIL, GDW, LGR, EXC, MHB, and PAR, and estimated FNF of minor streams for the 90% exceedance level. DWR does not provide 90% exceedance values for MHB and PAR; therefore, the available 30% exceedance values were added to the 90% exceedance forecast values. Minor stream FNFs were obtained from DWR's May 2007 Unimpaired Flow Data report, tables UF 1, UF 2, UF 3, UF 4, UF 5, UF 7, UF 10, and UF 17. Water year 1977 was used to reflect similarities in snowpack conditions.

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Delta Pre-14 Demand includes Pre-14-only demand. Basin Pre-14 Demand includes demand from Pre-14-only statements that did not report under the Informational Order, and Pre-14-only portion of the demand for statements that did report under the Order.



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# It's a Simple Approach

- Compile and Organize Diversion and Use Data (Demand)
- Compile and Organize Full Natural Flow Data (Supply)
- Apply Adjustments
- Plot These Adjusted Data On A Time-Series Chart
- General Overview Is Presented
  - Using Exhibits WR-68, WR-72, and WR-75

# WRUDS

- Water Rights Use Data Set (WRUDS) is a Microsoft Excel file of demand data used in creating supply/demand plots.
- Living document modified as additional information is made known to Division staff.
- Single source of demand data that can be queried through filters and worksheet calculations to generate subsets and summaries of data to help answer questions relating to water availability.

# eWRIMS/RMS

- Electronic Water Rights Information Management System (eWRIMS)
- Report Management System (RMS)
- Raw data file provided by Data Management Unit in February 2015 (WR-70)
- Data record for 2010 – 2013.

# Raw Data Cleanup and Organization

- Monthly diversion and use data downloaded from eWRIMS/RMS for 2010 through 2013.
- Contains data for the entire state.
- Extracted data for water rights within the Sacramento, San Joaquin, Eel River, Russian River, and Legal Delta watershed areas.
- Removed inactive or revoked rights, as well as stock pond, livestock, and other minor water right types.

# Raw Data Cleanup and Organization

- Multiple Points-of-Diversion (PODs):
  - Raw data file (WR-70) contains records identified by Point-of-Diversion (POD).
  - Riparian and Pre-1914: Single POD.
  - Post-1914: Multiple PODs, and, therefore, multiple records for the same water right.



# Raw Data Cleanup and Organization

- Multiple Points of Diversion:
  - For Post-1914 rights with multiple PODs located in the same watershed, all but one record were removed so that one representative record for each right remained.
  - For rights with multiple PODs located in more than one watershed, the watershed in which the majority of the PODs resided was designated as the primary watershed.

# Raw Data Cleanup and Organization

- Assigned Watershed Analysis Areas:

Analysis Area	Watershed(s)
Sacramento	American River, Ball Mountain, Bear River, Butte Creek, Cache Creek, Colusa Basin, Cortina, Eastern Tehama, Feather River, Marysville, McCloud River, Mountain Gate, Pit River, Putah Creek, Redding, Shasta Bally, Shasta Dam, Stony Creek, Tehama, Upper Elmira, Upper Sacramento, Valley American, Valley Putah Cache, Whitmore, Yuba River
San Joaquin	Ahwahnee, Delta-Mendota Canal, Gopher Ridge, Lower Calaveras, Mariposa, Merced River, Middle Sierra, Middle West Side, Mountain Gate, North Diablo Range, North Valley Floor, San Joaquin Valley Floor, Stanislaus River, Tuolumne River, Upper Calaveras, San Joaquin Delta South of Mossdale Bridge
Legal Delta	Sacramento Delta, San Joaquin Delta North of Mossdale Bridge, Suisun diversions within Legal Delta boundary
Eel	Eel River
Russian	Russian River

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WR-11

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# Development of Demand Data Set (WRUDS)

- Average Monthly Demands Calculated:
  - Average Monthly Diversion Over The Four Years
  - Example: June diversions reported by WSID under License 1381:
    - 3,442 acre-feet (AF) in 2010
    - 3,182 AF in 2011
    - 3,320 AF in 2012
    - 3,163 AF in 2013
  - Result: June Demand is 3,277 AF.

# Quality Control Review

- Over-Reporting
- Power-only/non-consumptive diversions
- Duplicate Reporting

# Over-Reporting of Demand Data

- Some Post-1914 right-holders reported diverting over 1,000,000 x their Face Value.
- Some Riparian and/or Pre-1914 claimants reported diverting over 40,000 x worst-case water duty of 8 acre-feet/acre.
- Equations written in WRUDS Workbook to make adjustments to average monthly diversions for each water right, if needed.

# Adjustments To Likely Over-Reporting

- Post-1914 Appropriative Rights:
  - Demands Reduced So As Not To Exceed Face Values
    - Reductions Weighted By Original Monthly Demand Distributions
  - Affected 584 Post-14 Rights with uses other than power-only in Exhibit WR-68
    - Adjustment Reduced Reported Demand from  $\approx 43$  million AF to  $\approx 380$  thousand
    - That's a 99% Reduction!

# Adjustments To Likely Over-Reporting

- Riparian/Pre-1914 Claims
  - Demands Reduced So As Not To Exceed 8 AF/Acre Water Use
    - Applied to Senior Diversions with Net Acreage > 0 in EWRIMS and Not Subject To Info Order
      - 2,113 Non-Duplicate Statements in WR-68
  - Of These, 93 Met Criteria To Reduce Demand
  - Adjustment Reduced Reported Demand from  $\approx 173,000$  AF to  $\approx 51,000$  AF for These 93 Rights

# Quality Control: Power-Only

- For each water right that listed Power as a beneficial use, review in EWRIMS to establish whether the beneficial use could be considered solely for power
- If power only, flagged.
- If the water right only had point(s) of direct diversion, Demand = 0
- Otherwise, Demand = Diverted – Used, or 0 for months where Used > Diverted



# Quality Control: Potential Duplicates

- If water rights had identical owner name, and each of the 12 monthly average diversions were equal, flagged as potential duplicates.
- Reviewed annual reports in eWRIMS for evidence supporting duplicate reporting.
- If evidence was compelling, then all but one right were flagged as confirmed duplicates.

# Quality Control: Other Adjustments

- Statement S008720 reported excessive diversion for the indicated Domestic & Fire Protection use
- 138,000 AF for 2013 vs. average household domestic use of approx. 0.4 AF (WR-71).
- Determined that the diversions were negligible, and therefore removed from the data set.
- Data was also adjusted to reflect stakeholder comments. (Testimony of Brian Coats).

# Information Order Demands

- 2014 demands incorporated for Senior diverters subject to Informational Order WR 2015-0002-DWR (WR-30)
- 2014 values replaced the 2010-2013 averaged demands in the WRUDS data set.
- If 2014 data were not reported, the 2010-2013 averages were used.

# Water Supply Data

- Water Supply Data maintained in Excel Workbook: ‘CDEC Supply Tables’
- Contains:
  - Daily Full Natural Flows (FNFs) as reported on CDEC website.
  - Monthly FNF forecasts provided by DWR from February - May each year.

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WR-149

SACRAMENTO RIVER AT BEND BRIDGE (BND)

Elevation: 286' · SACRAMENTO R basin · Operator: USGS and DWR

Provisional data, subject to change.

Query executed Wednesday at 12:24:40

Select a sensor type for a plot of data.

Earlier

Date	M FLOW	FNF	IRR&CNS	AF
10/06/2015	7323	2668		919
10/07/2015	7323	2901		919
10/08/2015	7328	3329		919
10/09/2015	7313	3739		919
10/10/2015	7352	5419		919

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# Daily FNF Data

- Collected daily FNF data from CDEC website for the following stations:

<b>Sacramento R. Watershed</b>	<b>San Joaquin R. Watershed</b>
BND (Sacramento R. at Bend Bridge)	MKM (Mokelumne R. at Mokelumne Hill)
ORO (Feather R. at Oroville Dam)	GDW (Stanislaus R. at Goodwin Dam)
YRS (Yuba R. near Smartville)	MHB (Cosumnes R. at Michigan Bar)
FOL (American River at Folsom Dam)	MIL (San Joaquin R. at Millerton)
	MRC (Merced R. near Merced Falls)
	TLG (Tuolumne R. at La Grange)

# Daily FNF Data

- At Frequent intervals:
  - Visited CDEC website for each of the 10 stations
  - Copied new data into the CDEC Supply Workbook(WR-72)
  - Added individual FNFs to get Analysis Area FNFs:
    - Sacramento = BND+ORO+YRS+FOL
    - San Joaquin = MKM+GDW+MHB+MIL+MRC+TLG
    - Combined = Sacramento + San Joaquin

# Monthly FNF Forecast Data

- Used May 1, 2015, Sacramento River & San Joaquin River Water Year Forecast Breakdowns (WR-73 & WR-74)
- Compiled 50-, 90-, and 99-% exceedance level values into the CDEC Supply Workbook (WR-72)

# Water Availability Analysis

- Compares FNF supply to demand by month.
- If demand  $>$  supply in a given month, a water shortage is indicated.
- Not intended to be hydrologic model, but tool to compare supply to demand in defined areas, and to estimate at what priority year demand  $>$  supply in a given month.
- Time-series graphs built in Microsoft Excel.

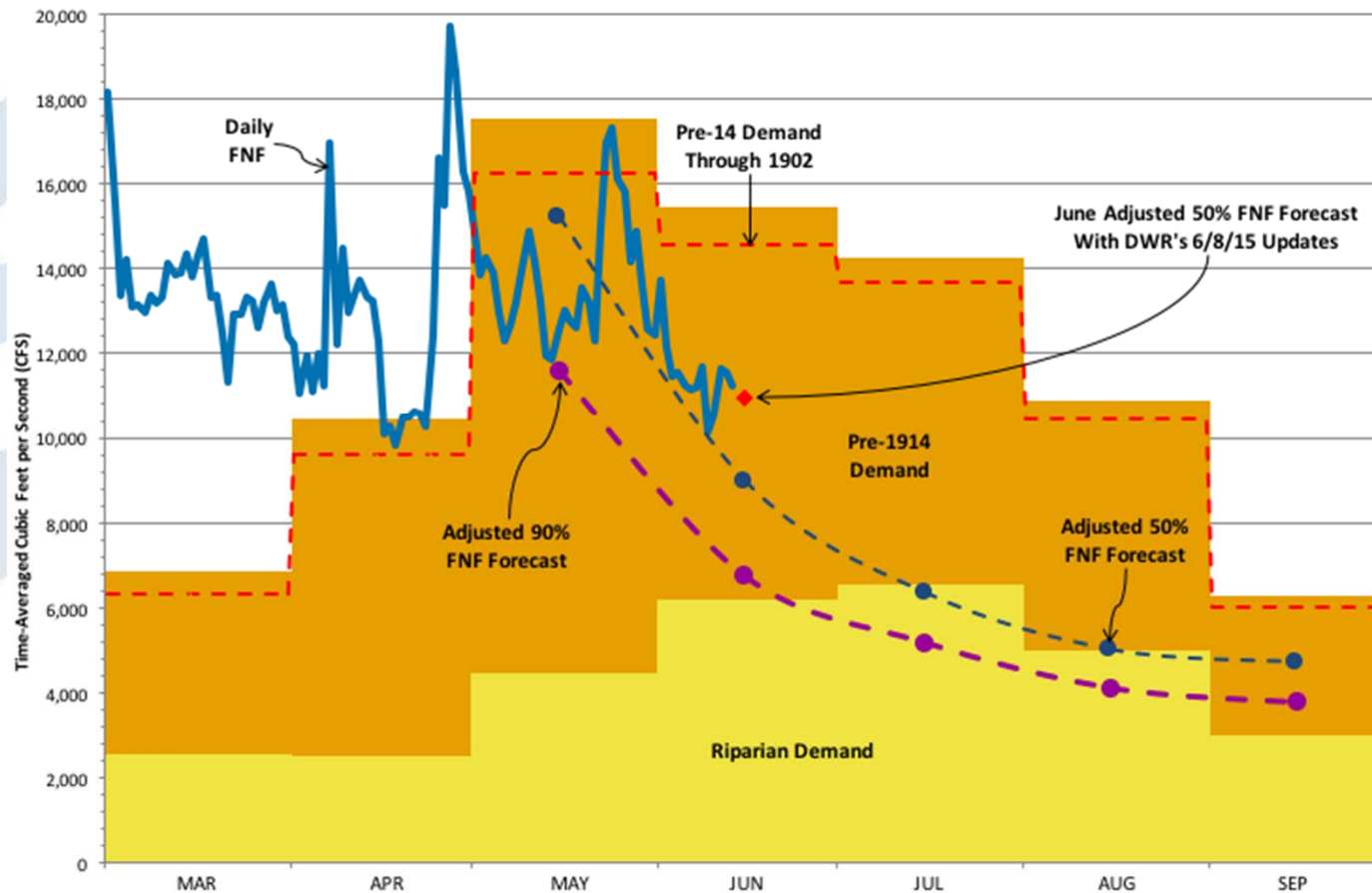


# Correction To Case-in-Chief Testimony WR-11

- A June 9, 2015, version of WRUDS was used in Exhibit WR-77
  - Not the June 15, 2015, version (WR-51) as stated in Testimony
- Certain stakeholder adjustments not included in WRUDS prior to June 12, 2015
- A copy of June 9, 2015, WRUDS version was not kept, but data still exists in WR-77

# Correction To Case-in-Chief Testimony WR-11

2015 Combined Sacramento/San Joaquin River Basin  
Senior Supply/Demand Analysis



See following page for additional information.

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WR-53, Senior Chart Tab

# Constructing The Graphs - Demand

- Start with Current WRUDS Data Set:
  - May 1: WRUDS 2015-05-01
  - June 12: WRUDS 2015-06-09
- Define the Area to be Evaluated
  - May 1: Sacramento and Legal Delta
  - June 12: Sacramento (excl. Cache Creek & Putah Creek Watersheds), San Joaquin, and Legal Delta

# Constructing The Graphs - Demand

- Create Pivot Tables To Filter/Subtotal Demands Of The Three Water Right Types:
  - May 1, 2015 Analysis (WR-75):
    - Senior Demand (Riparian)
    - Pre-14 Demand
    - Junior Demand (Post-14)

# Constructing The Graphs - Demand

- June 12, 2015 Analysis (WR-77):
  - Riparian & Pre-1914 Demands Only:
    - Delta Combined Senior Demand
      - Combined Riparian and Pre-14 Demands Reported under Information Order and Treated Them as Riparian
    - Delta Pre-14 Pivot
    - Riparian Demand Pivot
      - Demands Outside Legal Delta
    - Pre-14 Demand Pivot
      - Demands Outside Legal Delta

# Constructing The Graphs - Demand

- Subtotal Demands After Applying Appropriate Filters in Pivot Tables.
- Delta Demand Prorated (WR-75) for May 1, 2015 analysis (Testimony of Brian Coats).

# Demand Summary For May 1 Notice

<b>RIPARIAN</b>							
	<b>March</b>	<b>April</b>	<b>May</b>	<b>June</b>	<b>July</b>	<b>August</b>	<b>September</b>
Sacramento	17,579	31,140	53,626	57,476	56,307	49,673	34,789
Delta	12,072	21,274	36,693	51,152	51,572	43,171	28,846
<i>FNF Ratio</i>	78.7%	70.0%	63.4%	78.0%	92.2%	97.9%	98.9%
Prorated Delta	9,497	14,889	23,256	39,916	47,556	42,257	28,536
<b>Total Sacramento + Delta</b>	<b>27,077</b>	<b>46,029</b>	<b>76,883</b>	<b>97,392</b>	<b>103,863</b>	<b>91,929</b>	<b>63,324</b>
<b>PRE-14</b>							
	<b>March</b>	<b>April</b>	<b>May</b>	<b>June</b>	<b>July</b>	<b>August</b>	<b>September</b>
Sacramento	70,135	122,690	399,748	380,716	384,201	297,797	143,466
Delta	109,666	69,937	128,288	250,923	191,338	133,135	74,485
<i>FNF Ratio</i>	78.7%	70.0%	63.4%	78.0%	92.2%	97.9%	98.9%
Prorated Delta	86,277	48,946	81,309	195,807	176,438	130,317	73,684
<b>Total Sacramento + Delta</b>	<b>156,412</b>	<b>171,636</b>	<b>481,057</b>	<b>576,523</b>	<b>560,640</b>	<b>428,114</b>	<b>217,151</b>
<b>POST-14, ALL</b>							
	<b>March</b>	<b>April</b>	<b>May</b>	<b>June</b>	<b>July</b>	<b>August</b>	<b>September</b>
Sacramento	2,782,948	3,009,649	1,765,916	1,392,613	913,148	720,490	572,319
Delta	203,592	133,669	230,093	308,101	376,210	353,536	308,921
<i>FNF Ratio</i>	78.7%	70.0%	63.4%	78.0%	92.2%	97.9%	98.9%
Prorated Delta	160,170	93,549	145,834	240,426	346,915	346,053	305,600
<b>Total Sacramento + Delta</b>	<b>2,943,118</b>	<b>3,103,199</b>	<b>1,911,750</b>	<b>1,633,039</b>	<b>1,260,063</b>	<b>1,066,543</b>	<b>877,919</b>

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WR-75, Prorated Demand Tab

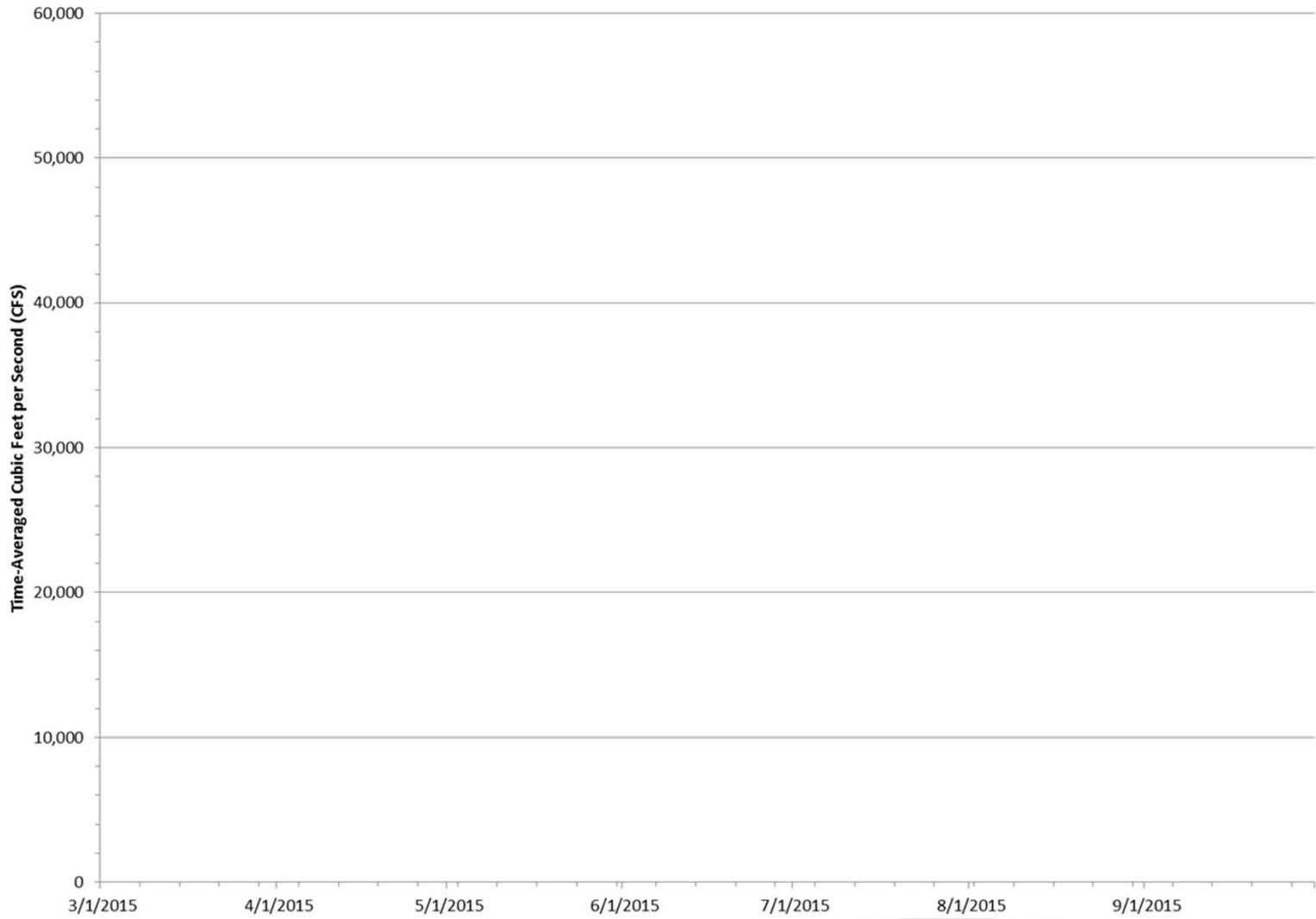
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# Constructing The Graphs - Demand

- Convert Demands From Monthly AF to Daily CFS
- Plot The Demand:
  - Stacked in order of Priority
    - Closer to X-Axis means more senior in priority



# 2015 Sacramento River Basin Supply/Demand

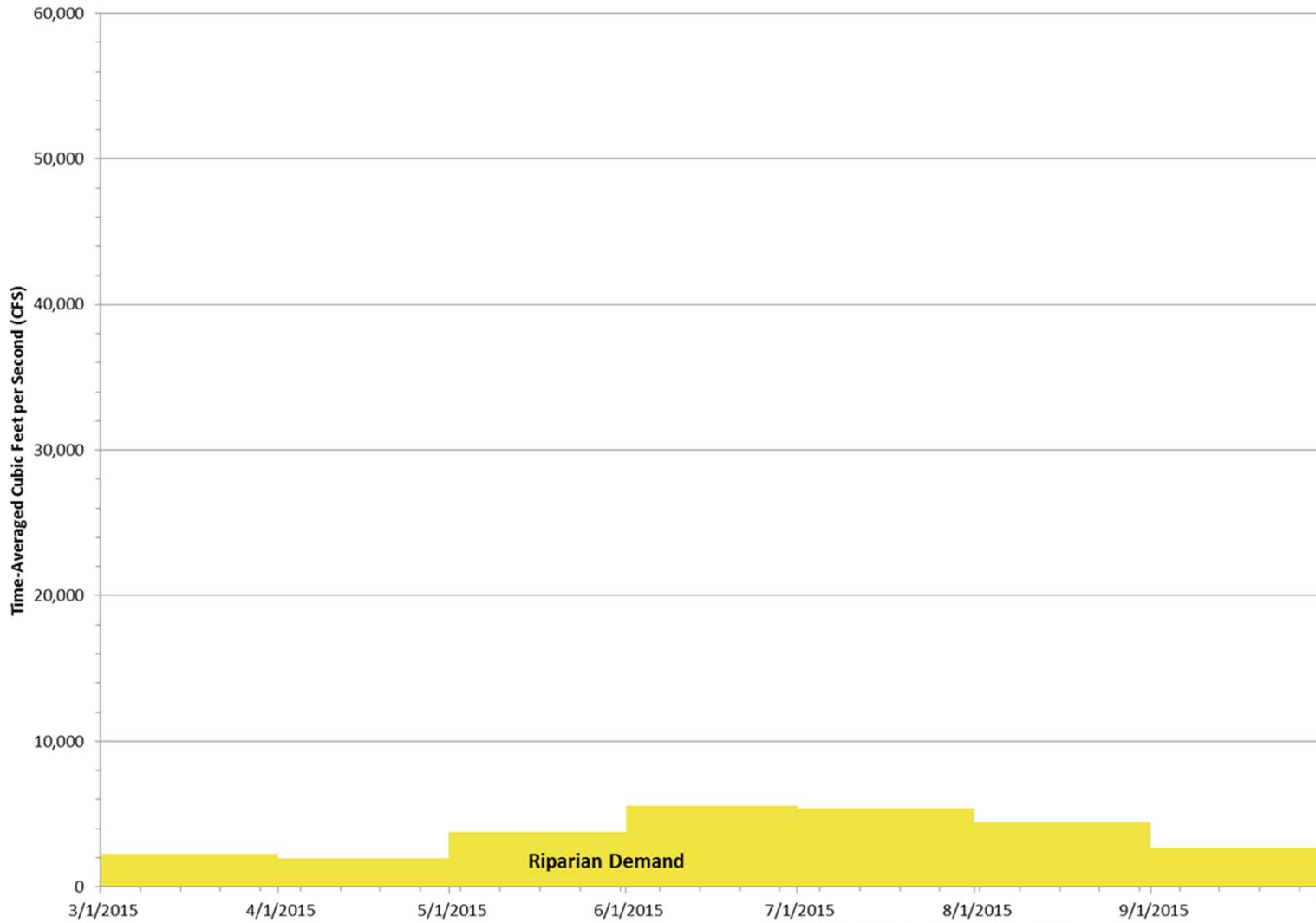


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WR-75, Prorated Chart Tab

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# 2015 Sacramento River Basin Supply/Demand

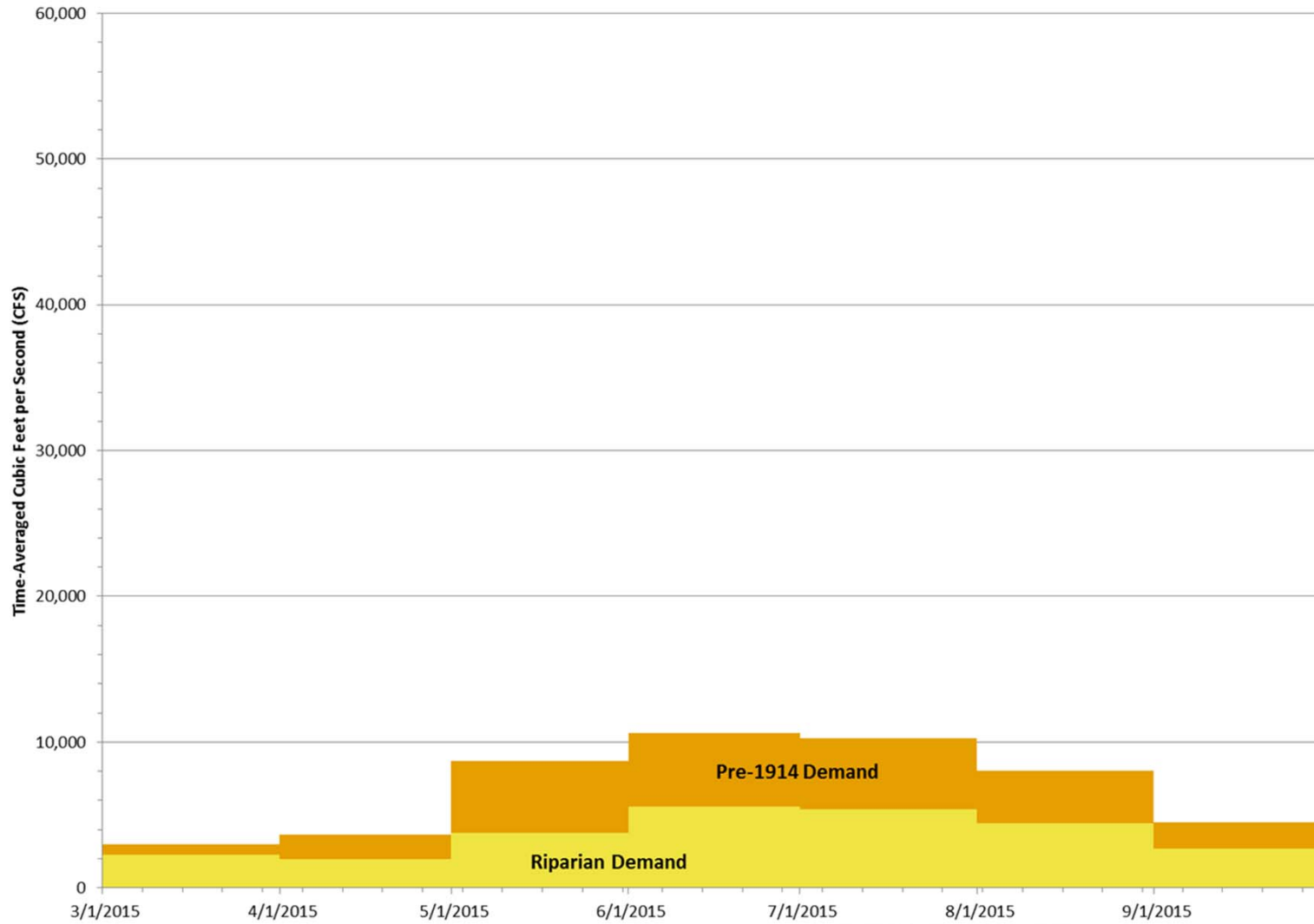


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April 1, 4, 6, 2016

WR-75, Prorated Chart Tab

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## 2015 Sacramento River Basin Supply/Demand

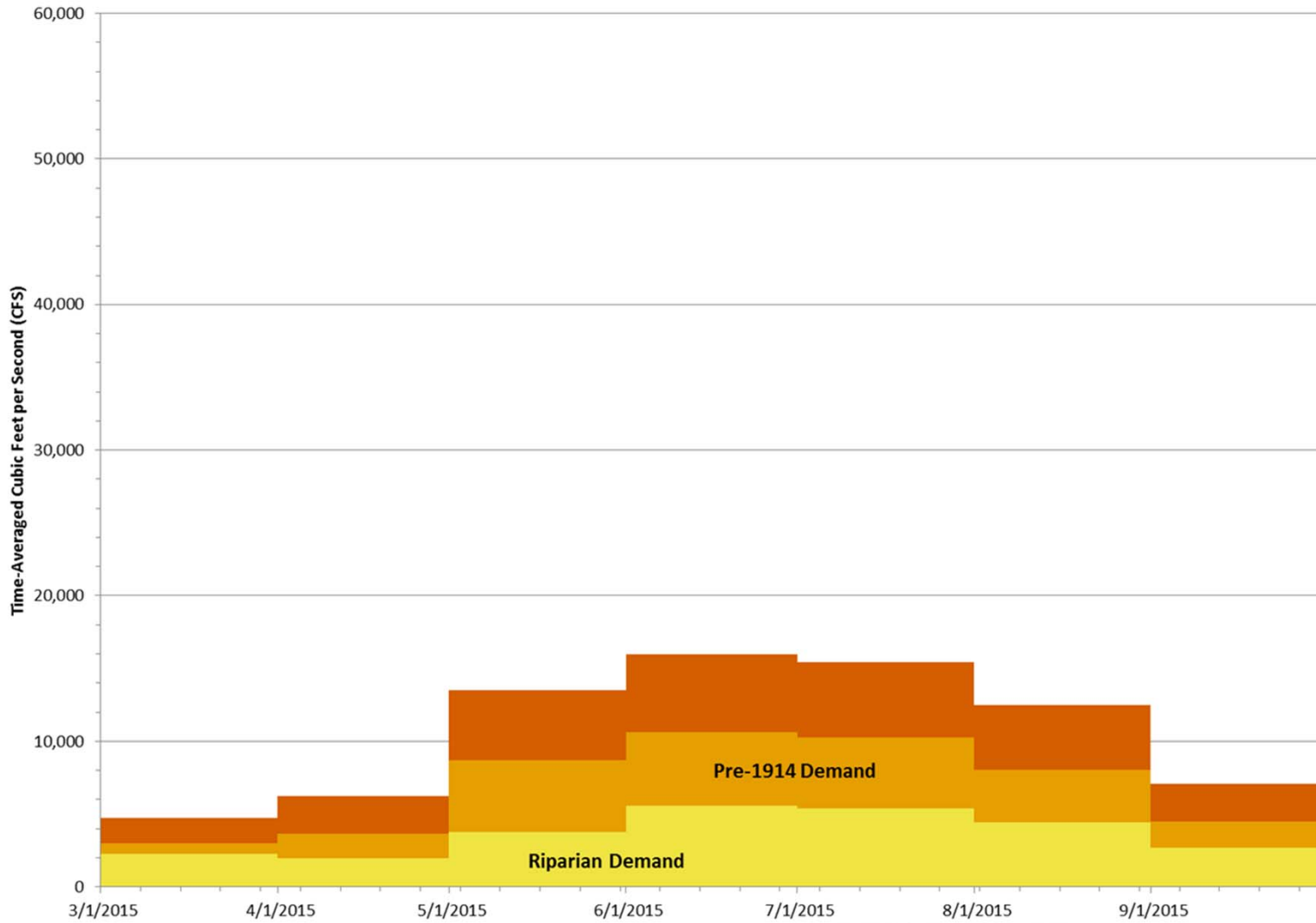


March 21-25, 28-30,  
April 1, 4, 6, 2016

WR-75, Prorated Chart Tab

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# 2015 Sacramento River Basin Supply/Demand

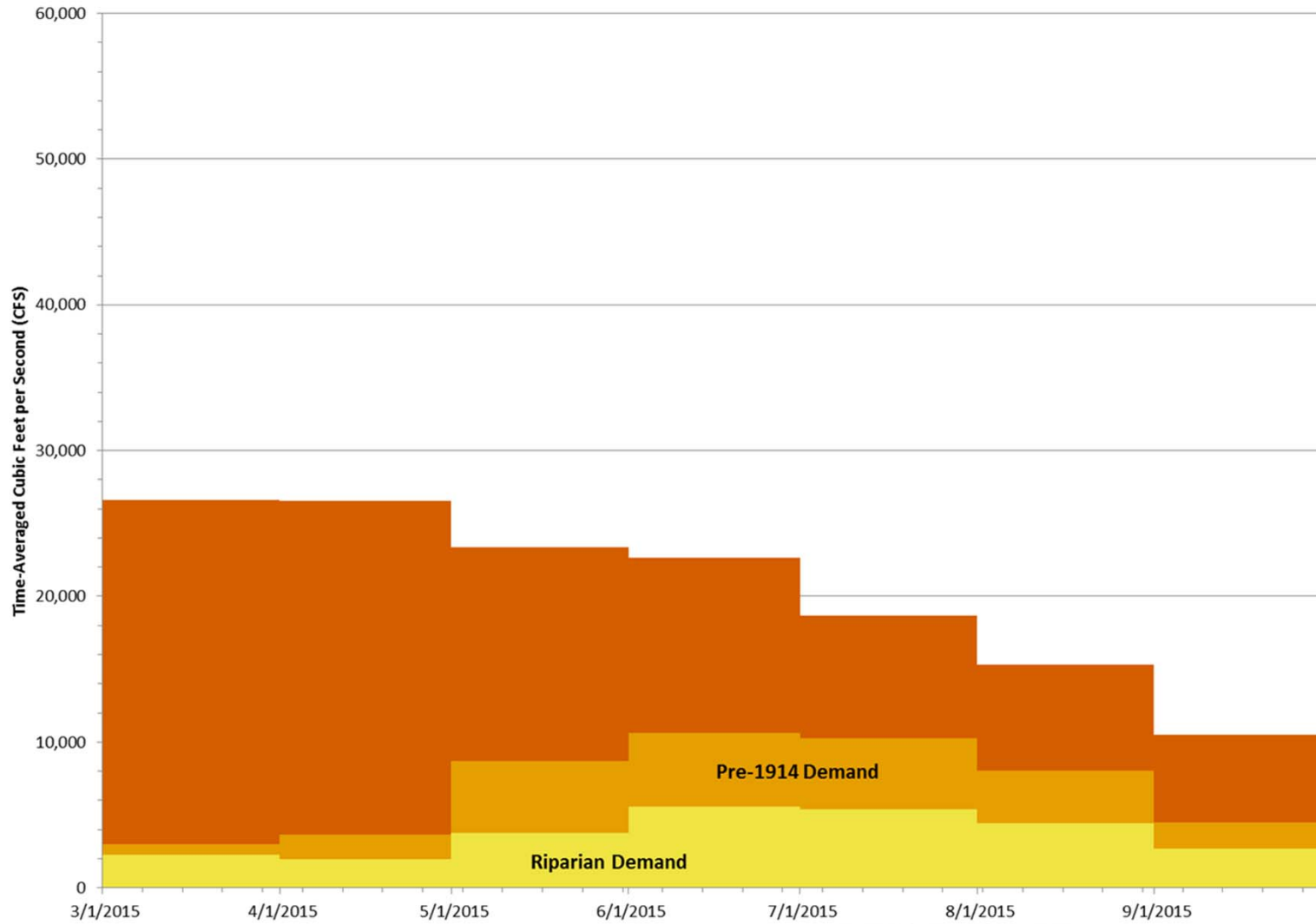


March 21-25, 28-30,  
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WR-75, Prorated Chart Tab

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# 2015 Sacramento River Basin Supply/Demand

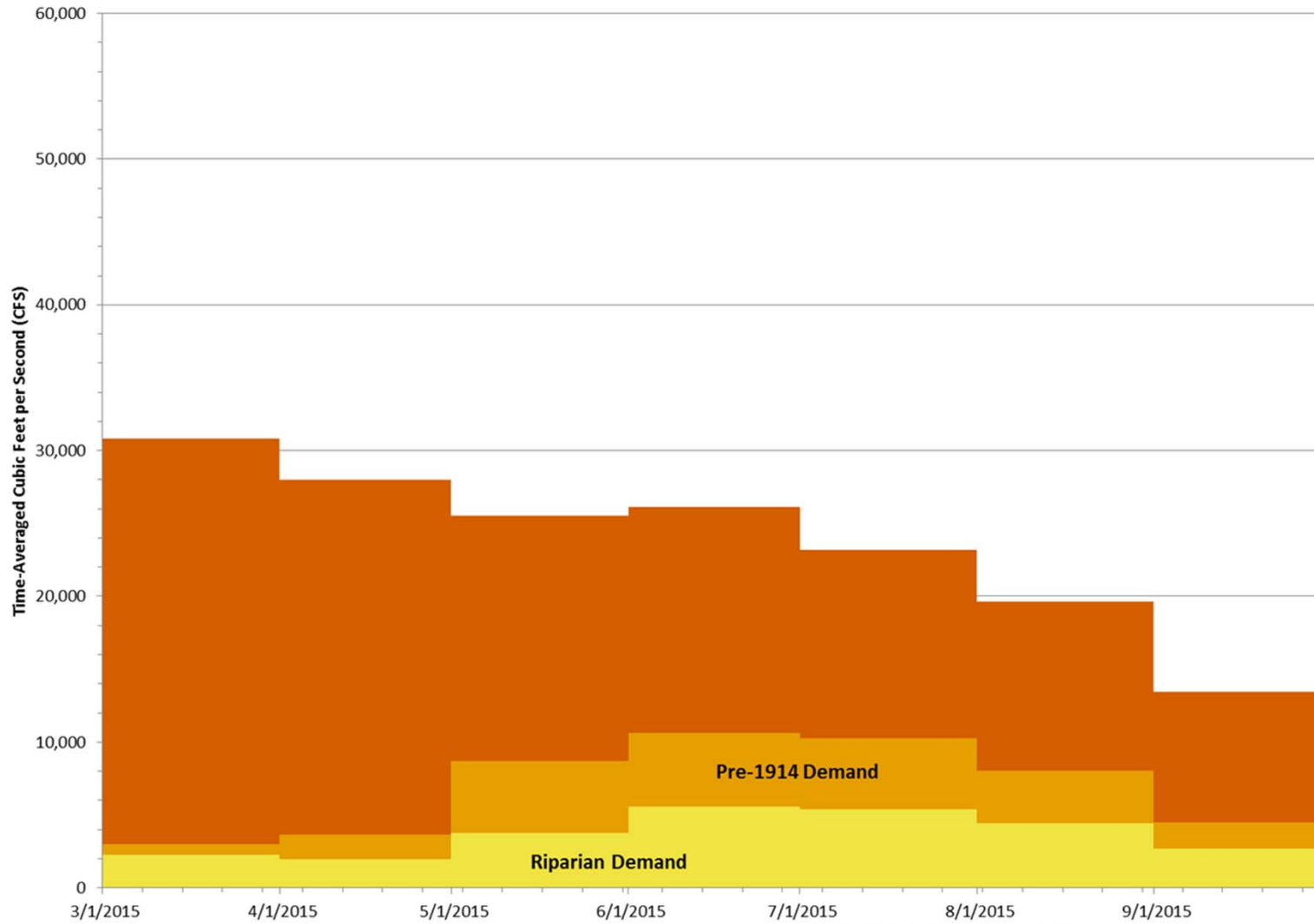


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## 2015 Sacramento River Basin Supply/Demand

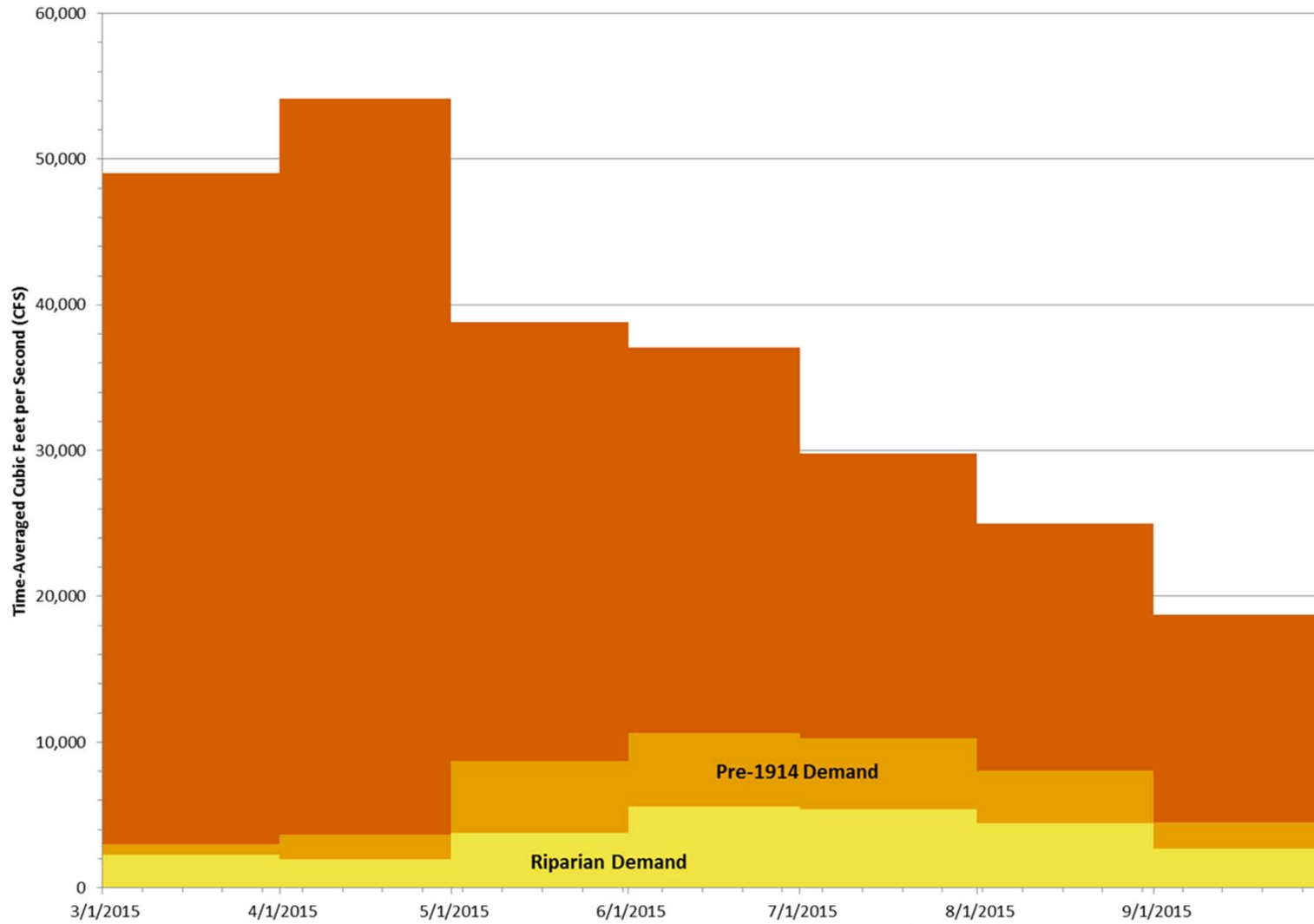


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April 1, 4, 6, 2016

WR-75, Prorated Chart Tab

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## 2015 Sacramento River Basin Supply/Demand

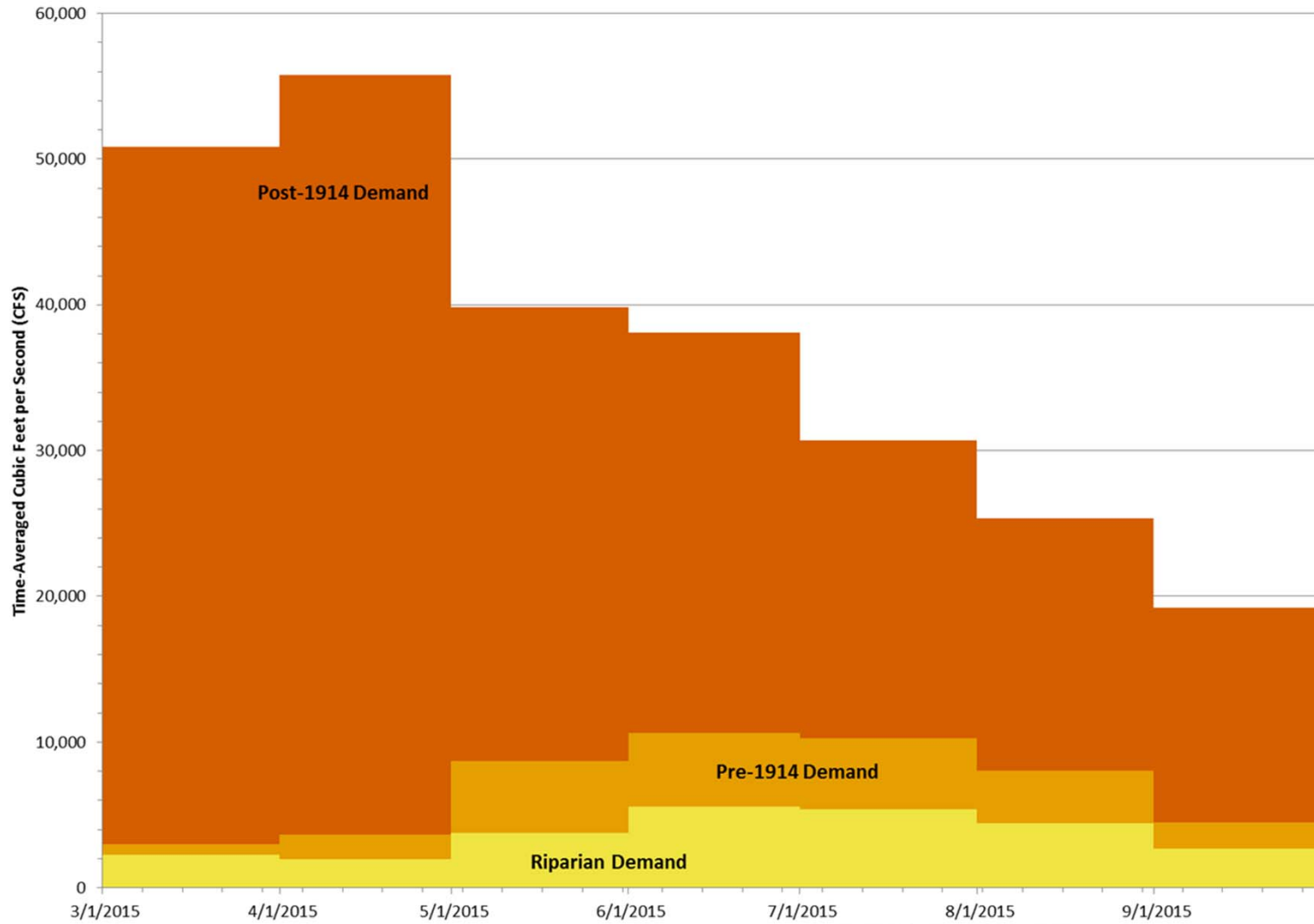


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## 2015 Sacramento River Basin Supply/Demand



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# Constructing The Graphs - Supply

- Start with May 1, 2015, CDEC Water Year Forecast Breakdowns (WR-73 & 74)
- Make Adjustments To Account For:
  - Minor Tributary Additions
  - Return Flows

# FNF Forecast Adjustments

- May 1 Analysis (WR-75):
  - Minor Tributary Additions
    - DWR Unimpaired Flow Data (Exhibit WR-76)
- June 12 Analysis (WR-77):
  - San Joaquin Riparian Return Flows
    - 0 to 20%, from 1977 Drought Report (WR-79)
  - 40% Delta Riparian & Pre-14 Return Flow
  - Minor Tributary Additions

# FNF Forecast Adjustments

TOTAL RETURN FLOW AND MINOR TRIBUTARIES (Add to FNF Forecasts)								
	March	April	May	June	July	August	September	
Minor Sac Valley Floor	10,000	-	3,000	-	-	-	-	(UF 1)
Putah Creek	6,000	4,000	3,000	3,000	2,000	1,000	1,000	(UF 2)
Cache Creek	-	-	-	-	-	-	-	(UF 3)
Stony Creek	6,000	-	2,000	-	-	-	-	(UF 4)
Sac Valley West Side Minor	6,000	5,000	5,000	1,000	-	-	-	(UF 5)
Sac Valley East Side Minor	34,000	30,000	34,000	24,000	20,000	19,000	23,000	(UF 7)
Bear River	4,000	-	1,000	-	-	-	-	(UF 10)
Sac Return Flow	-	-	-	-	-	-	-	
Prorated Delta Return Flow	-	-	-	-	-	-	-	
<b>Total Adjustment (AF)</b>	<b>66,000</b>	<b>39,000</b>	<b>48,000</b>	<b>28,000</b>	<b>22,000</b>	<b>20,000</b>	<b>24,000</b>	
<b>Total Adjustment (CFS)</b>	<b>1,073</b>	<b>655</b>	<b>781</b>	<b>471</b>	<b>358</b>	<b>325</b>	<b>403</b>	

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# FNF Forecast Adjustments

SAN JOAQUIN RIPARIAN RETURN FLOWS (ACRE-FEET)								
	March	April	May	June	July	August	September	Source
Demand	34,252	50,969	95,161	132,625	155,730	122,118	60,389	Senior Demand Summary, Row 4
RF Factor	0.2	0.2	0.1	0.1	-	-	-	1977 Drought Report
<b>SJ Return Flow</b>	<b>6,850</b>	<b>10,194</b>	<b>9,516</b>	<b>13,262</b>	-	-	-	
DELTA RETURN FLOW, RIPARIAN & PRE-14 (ACRE-FEET)								
	March	April	May	June	July	August	September	Source
Riparian	105,820	70,970	129,894	183,578	196,442	141,356	85,921	Senior Demand Summary, Row 5
Pre-14	15,940	20,315	35,203	48,247	46,704	35,296	17,651	Senior Demand Summary, Row 12
<i>Total</i>	<i>121,760</i>	<i>91,284</i>	<i>165,097</i>	<i>231,825</i>	<i>243,145</i>	<i>176,651</i>	<i>103,572</i>	
Return Flow Factor	0.4	0.4	0.4	0.4	0.4	0.4	0.4	Assumed, based on discussions with Delta stakeholders
<b>Delta Return Flow</b>	<b>48,704</b>	<b>36,514</b>	<b>66,039</b>	<b>92,730</b>	<b>97,258</b>	<b>70,660</b>	<b>41,429</b>	
RETURN FLOW + MINOR ADDITIONS (Add to FNF)								
	March	April	May	June	July	August	September	Source
SJ Valley Floor Minor Str	1,000	1,000	1,000	-	-	-	-	(DWR Unimpaired Flow Data, UF 17, WY 1977)
Minor Sac Valley Floor	10,000	-	3,000	-	-	-	-	(UF 1)
Putah Creek	6,000	4,000	3,000	3,000	2,000	1,000	1,000	(UF 2)
Cache Creek	-	-	-	-	-	-	-	(UF 3)
Stony Creek	6,000	-	2,000	-	-	-	-	(UF 4)
Sac Valley West Side Mir	6,000	5,000	5,000	1,000	-	-	-	(UF 5)
Sac Valley East Side Minc	34,000	30,000	34,000	24,000	20,000	19,000	23,000	(UF 7)
Bear River	4,000	-	1,000	-	-	-	-	(UF 10)
SJ Return Flow	6,850	10,194	9,516	13,262	-	-	-	Row 5
SAC Return Flow	-	-	-	-	-	-	-	
Delta Return Flow	48,704	36,514	66,039	92,730	97,258	70,660	41,429	Row 13
<b>Return Flow (AF)</b>	<b>122,555</b>	<b>86,708</b>	<b>124,555</b>	<b>133,993</b>	<b>119,258</b>	<b>90,660</b>	<b>65,429</b>	
<b>Return Flow (CFS)</b>	<b>1,993</b>	<b>1,457</b>	<b>2,026</b>	<b>2,252</b>	<b>1,940</b>	<b>1,474</b>	<b>1,100</b>	

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WR-77, FNF Adjustments Tab

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# Constructing The Graphs - Supply

- Convert Monthly Adjusted FNF Forecasts From Monthly AF to CFS
- Plot Adjusted FNFs at Midpoint of Month to Represent Monthly Value
- Plot Daily FNF Data

## 2015 Combined Sacramento/San Joaquin River Basin Senior Supply/Demand

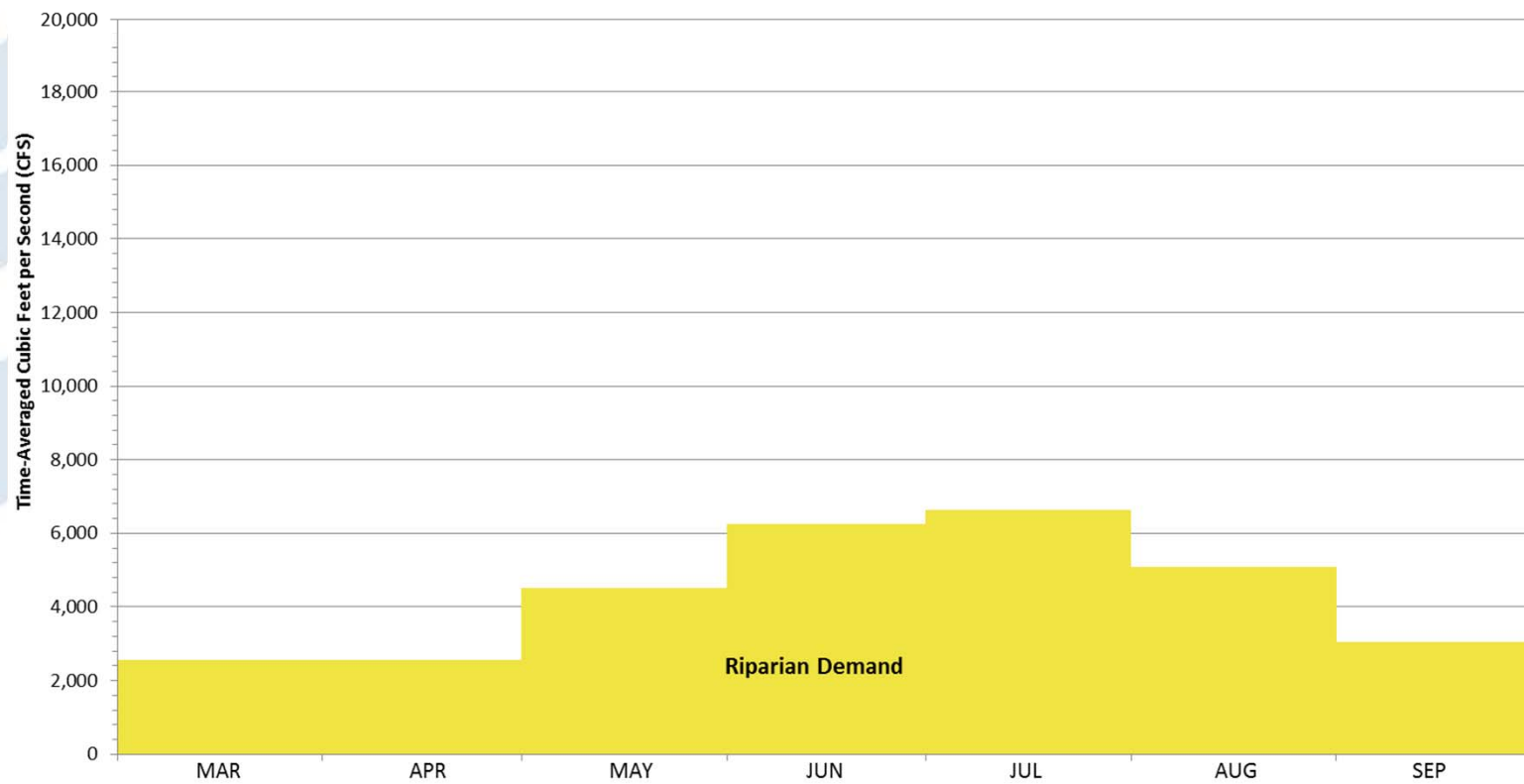


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## 2015 Combined Sacramento/San Joaquin River Basin Senior Supply/Demand

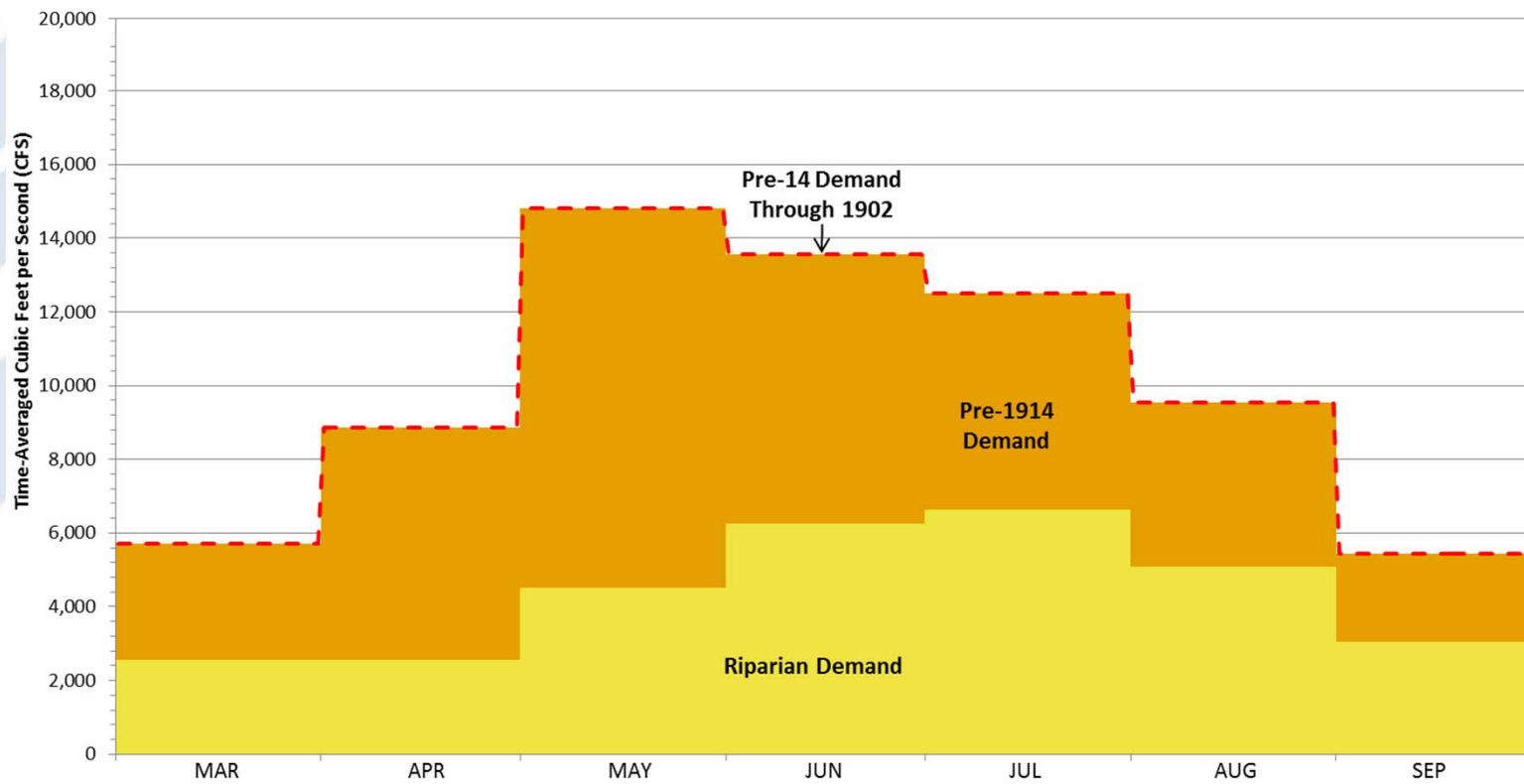


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## 2015 Combined Sacramento/San Joaquin River Basin Senior Supply/Demand



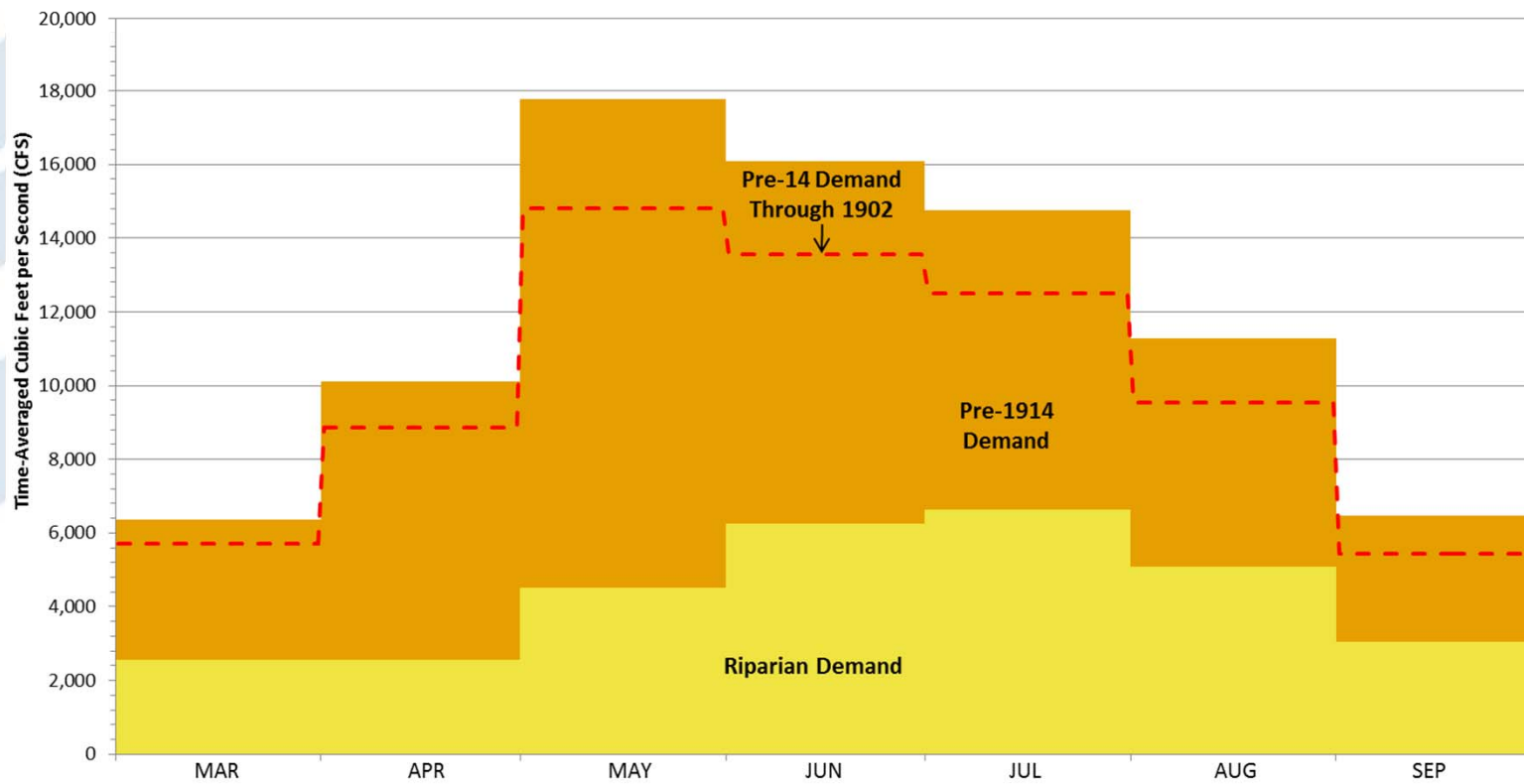
March 21-25, 28-30,  
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## 2015 Combined Sacramento/San Joaquin River Basin Senior Supply/Demand

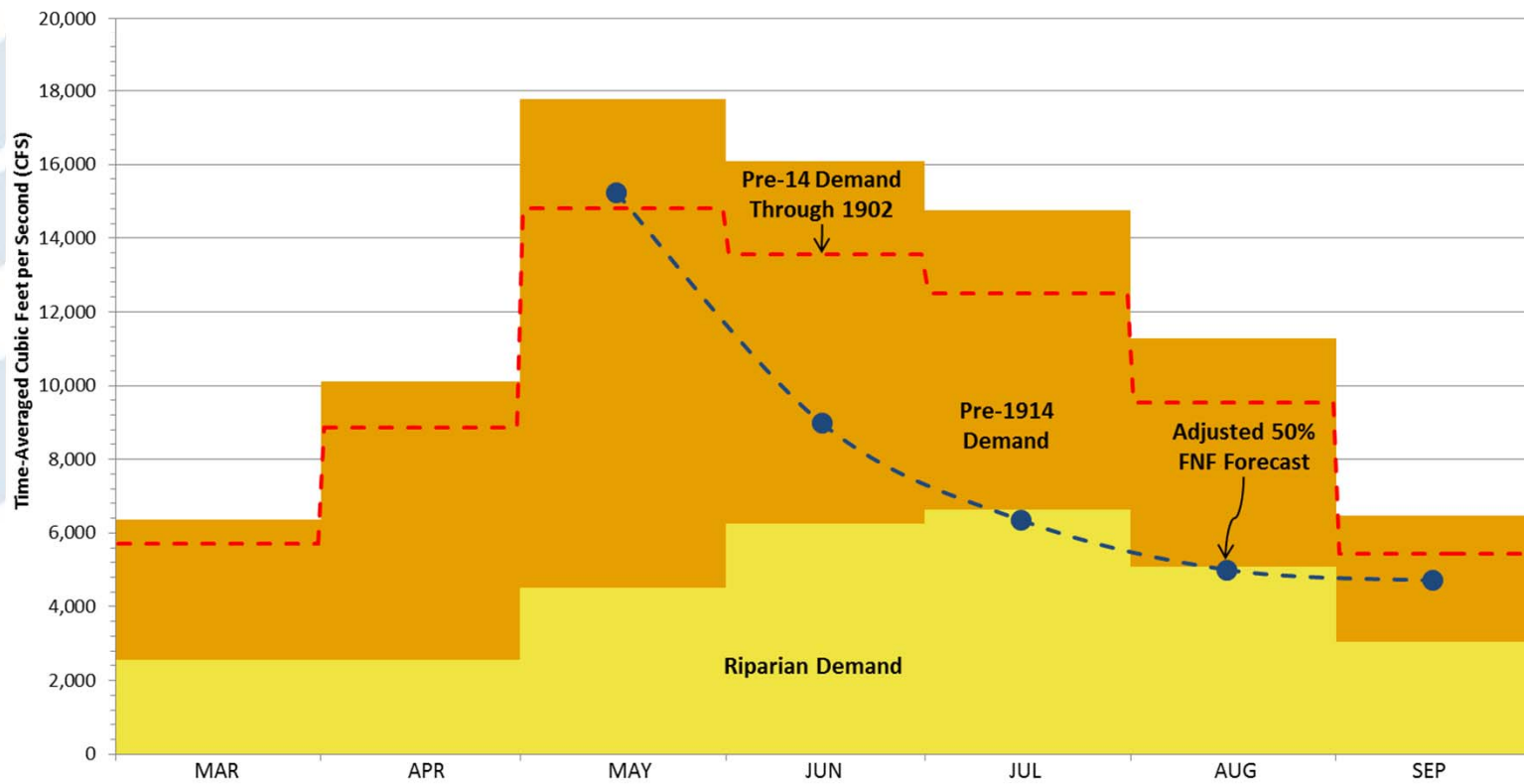


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## 2015 Combined Sacramento/San Joaquin River Basin Senior Supply/Demand

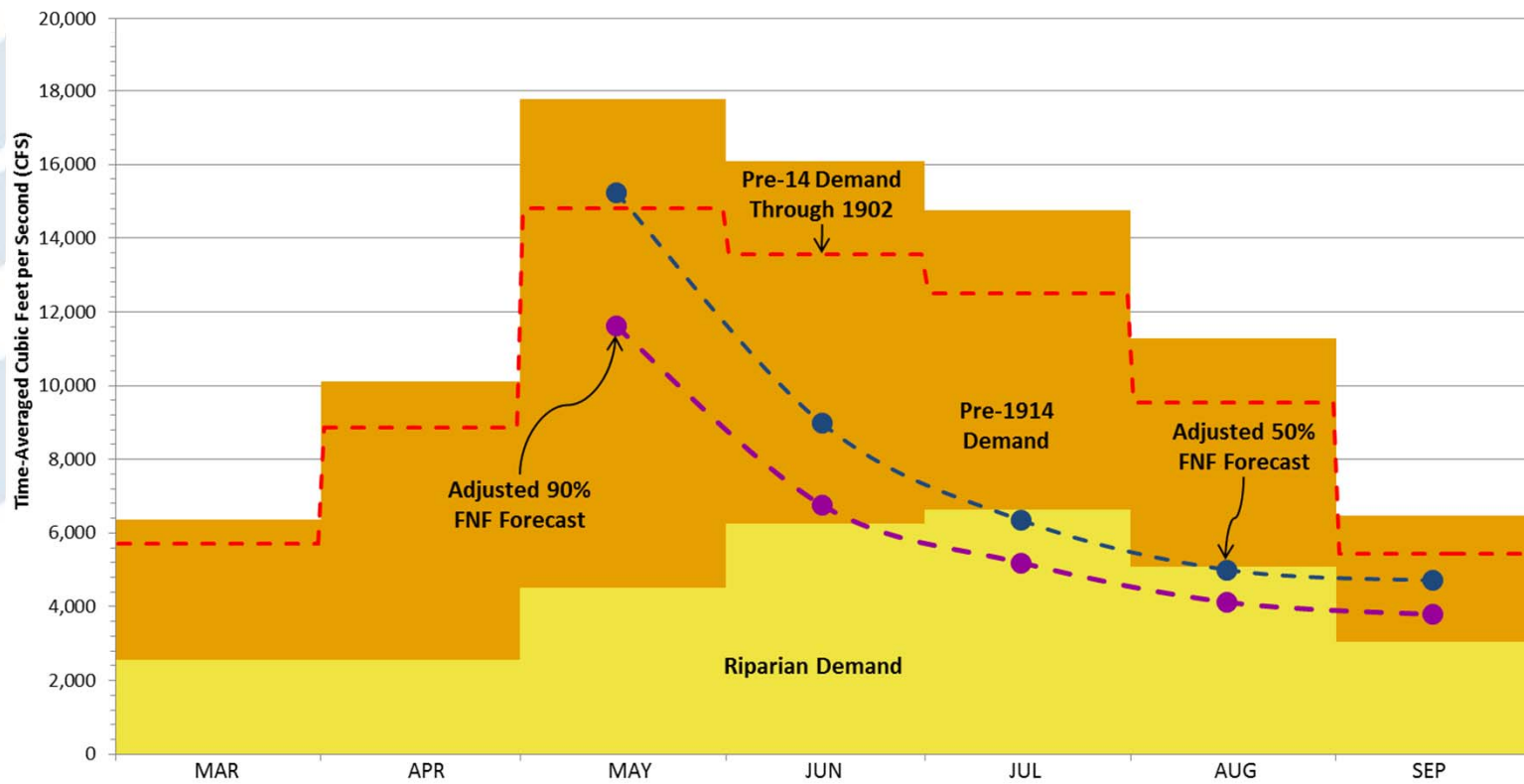


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## 2015 Combined Sacramento/San Joaquin River Basin Senior Supply/Demand

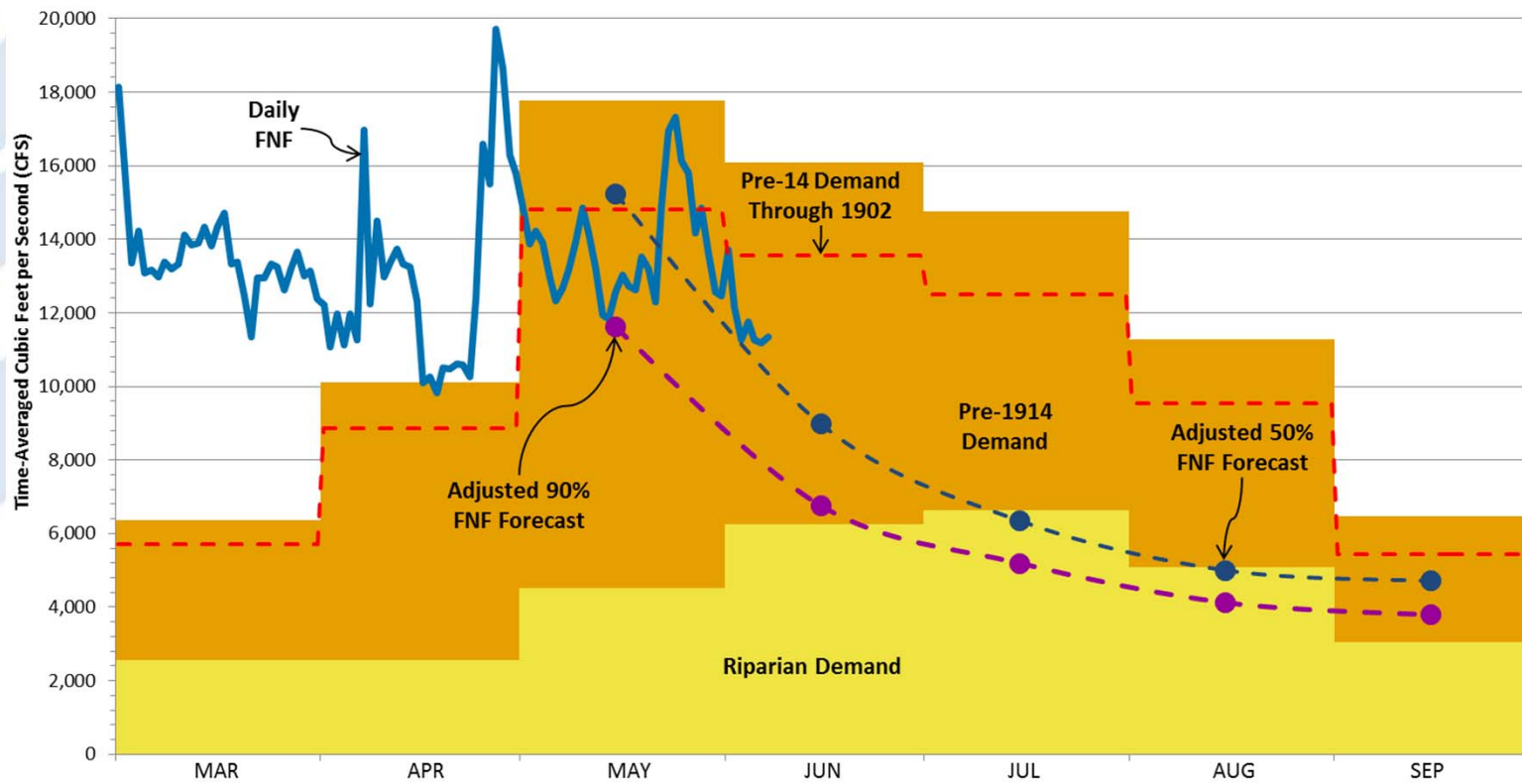


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## 2015 Combined Sacramento/San Joaquin River Basin Senior Supply/Demand



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## 2015 Combined Sacramento/San Joaquin River Basin Senior Supply/Demand

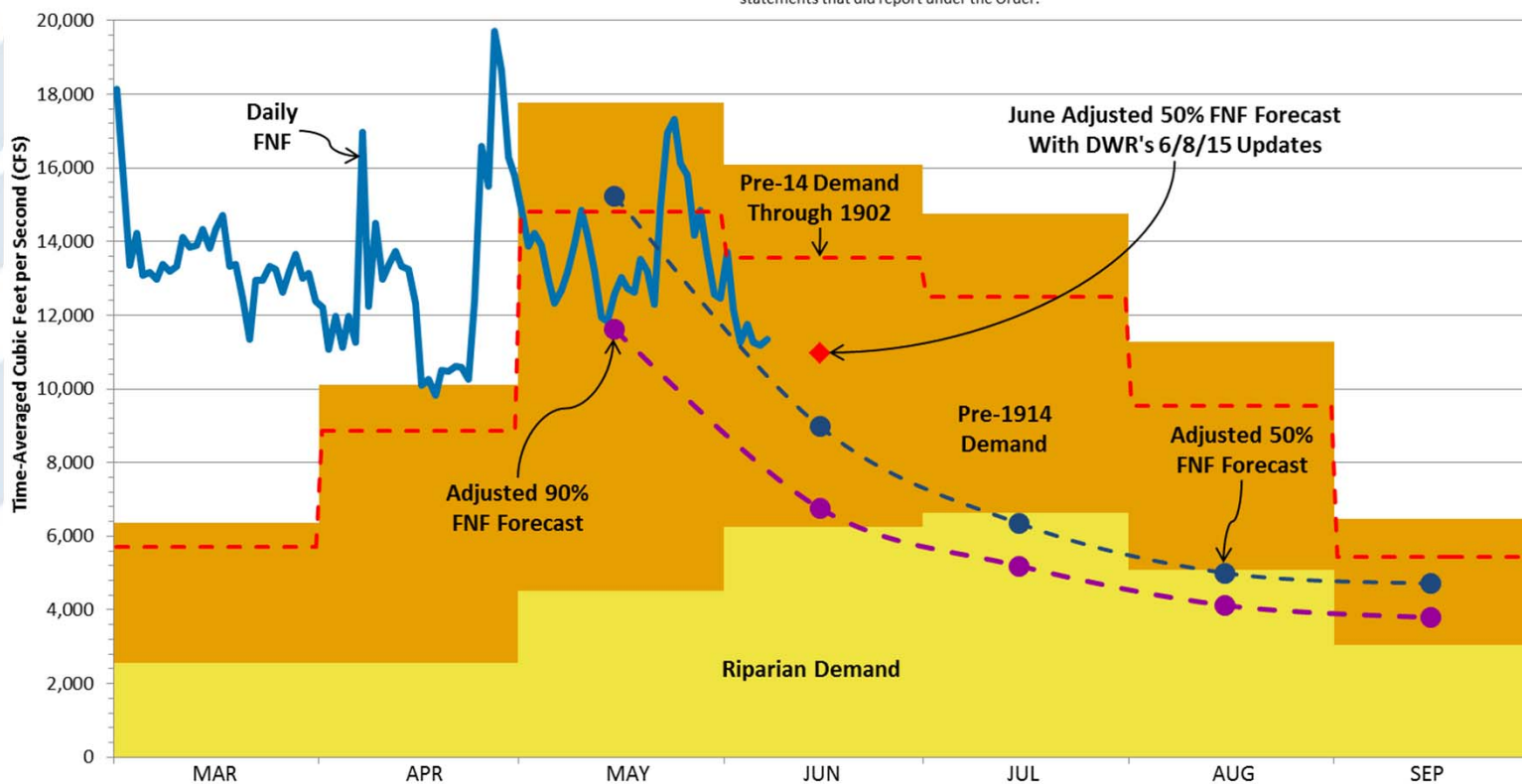
Daily Full Natural Flow (FNF) from CDEC Stations BND, ORO, YRS, FOL, TLG, MRC, GDW, MIL, MKM, and MHB, current through 6/7/2015.

Monthly Adjusted FNF Forecast points include DWR's May 2015 FNF Forecasts for BND, ORO, YRS, FOL, MIL, GDW, LGR, EXC, MHB, and PAR, and estimated FNF of minor streams for the 90% exceedance level. DWR does not provide 90% exceedance values for MHB and PAR; therefore, the available 50% exceedance values were added to the 90% exceedance forecast values. Minor stream FNFs were obtained from DWR's May 2007 Unimpaired Flow Data report, tables UF 1, UF 2, UF 3, UF 4, UF 5, UF 7, UF 10, and UF 17. Water year 1977 was used to reflect similarities in snowpack conditions.

Return flows were added to the 50% and 90% Adjusted FNF Forecast values as follows: For the San Joaquin Watershed, a percentage of the Riparian demand as used in the 1977 Drought Report (20% in April, 10% in May & June, and 0% in July, August, & September). For the Delta contribution, an assumed 40% of the prorated Riparian and Pre-14 demand was used as return flow.

Delta Riparian Demand includes Riparian-only and combination Riparian/Pre-14 demand for both statements reporting under the Informational Order and those not. Basin Riparian Demand includes Riparian-only and combination Riparian/Pre-14 demand for statements that did not report under the Order, and Riparian-only portion of the demand for statements that did report under the Order.

Delta Pre-14 Demand includes Pre-14-only demand. Basin Pre-14 Demand includes demand from Pre-14-only statements that did not report under the Informational Order, and Pre-14-only portion of the demand for statements that did report under the Order.



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# Conditions at Time of 6/12/15 Unavailability Notice

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## 2015 Combined Sacramento/San Joaquin River Basin Senior Supply/Demand

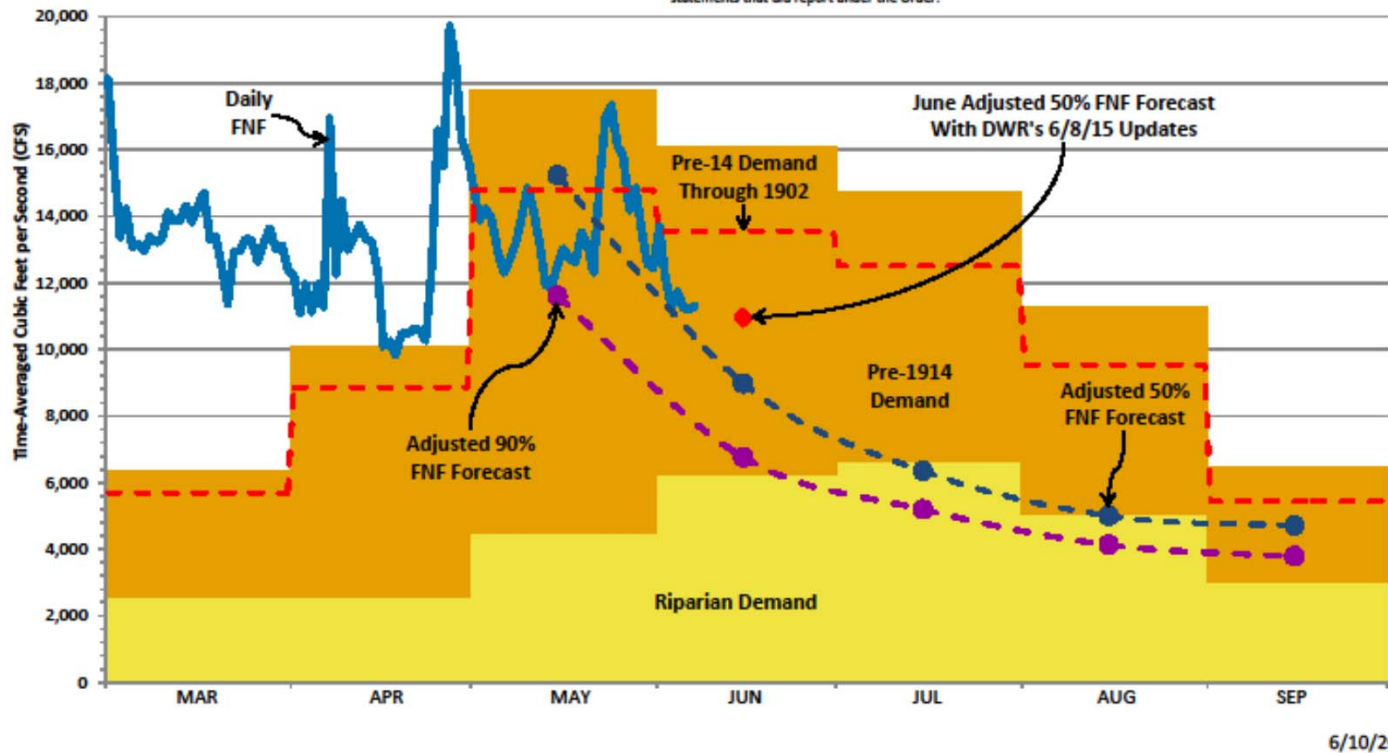
Daily Full Natural Flow (FNF) from CDEC Stations BND, ORD, YRS, FOL, TLG, MRC, GDW, MIL, MKM, and MHB, current through 6/7/2015.

Monthly Adjusted FNF Forecast points include DWR's May 2015 FNF Forecasts for BND, ORD, YRS, FOL, MIL, GDW, LGR, EXC, MHB, and PAR, and estimated FNF of minor streams for the 90% exceedance level. DWR does not provide 90% exceedance values for MHB and PAR; therefore, the available 30% exceedance values were added to the 90% exceedance forecast values. Minor stream FNFs were obtained from DWR's May 2007 Unimpaired Flow Data report, tables UF 1, UF 2, UF 3, UF 4, UF 5, UF 7, UF 10, and UF 17. Water year 1977 was used to reflect similarities in snowpack conditions.

Return flows were added to the 30% and 90% Adjusted FNF Forecast values as follows: For the San Joaquin Watershed, a percentage of the Riparian demand as used in the 1977 Drought Report (20% in April, 10% in May & June, and 0% in July, August, & September). For the Delta contribution, an assumed 40% of the prorated Riparian and Pre-14 demand was used as return flow.

Delta Riparian Demand includes Riparian-only and combination Riparian/Pre-14 demand for both statements reporting under the Informational Order and those not. Basin Riparian Demand includes Riparian-only and combination Riparian/Pre-14 demand for statements that did not report under the Order, and Riparian-only portion of the demand for statements that did report under the Order.

Delta Pre-14 Demand includes Pre-14-only demand. Basin Pre-14 Demand includes demand from Pre-14-only statements that did not report under the Informational Order, and Pre-14-only portion of the demand for statements that did report under the Order.



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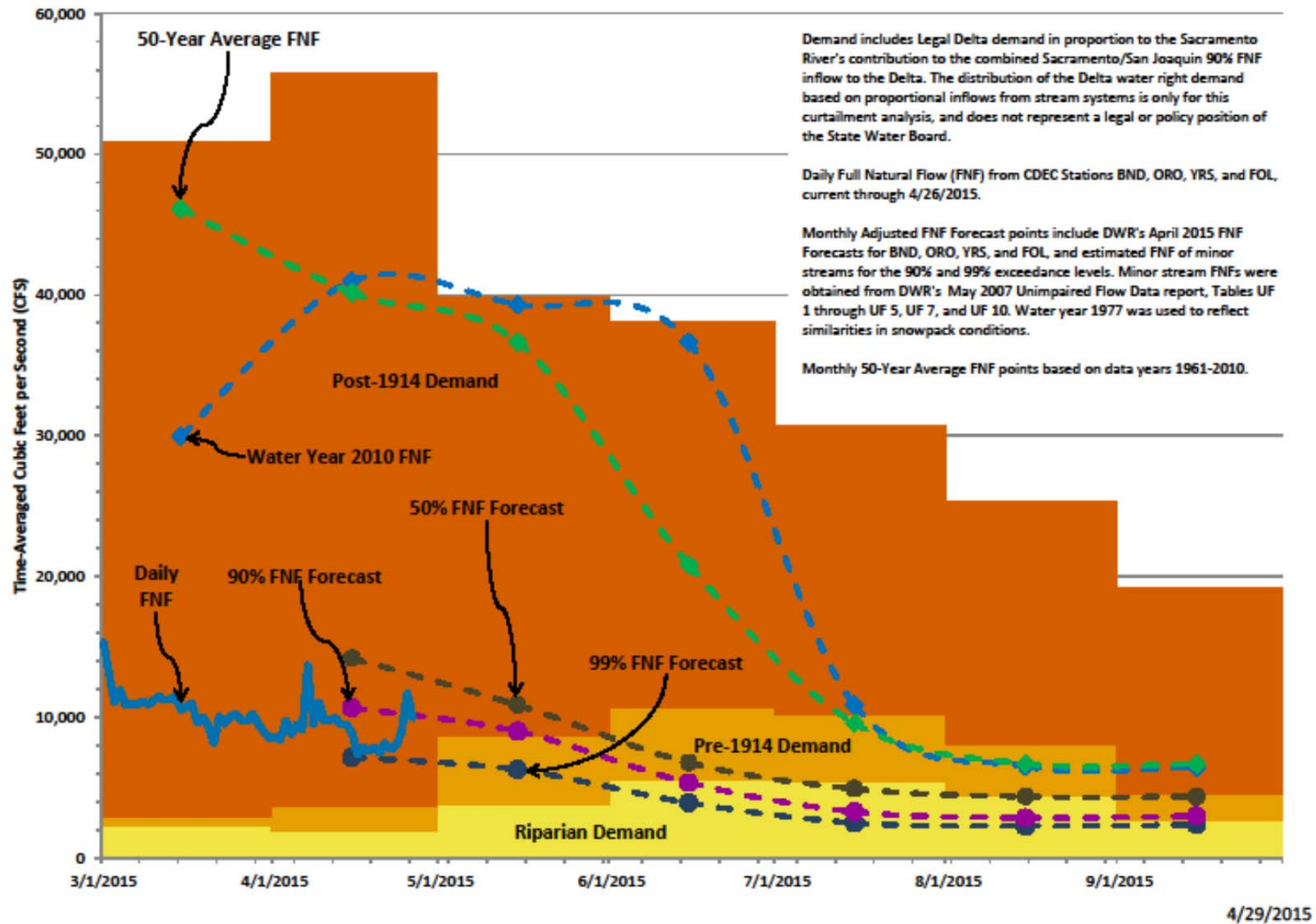
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# Conditions at Time of 5/1/15 Unavailability Notice

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## 2015 Sacramento River Basin Supply/Demand



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# **Paul Wells**

## **BBID Diversions**

### **June 13-24, 2015**

- BBID diverted 1,920 acre-feet from June 13 through June 24, 2015 (CDEC)
- BBID typically diverts 1,920 acre-feet during any 12 day period in June
- BBID has provided no basis for reducing the diversion amount from that reported on the CDEC website

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# WSID 2015 Diversions

- Diversions under License 1381
  - 735.51 acre-feet from the Old River on 13 consecutive days from May 1 to May 13, 2015
- Diversions under BCID Agreement
  - 85.08 acre-feet from June 17 - 27, 2015
- Diversion of Bethany Drain Flows
  - 2,459 acre-feet from May – October, 2015

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# WSID 2015 Diversions

- City of Tracy Wastewater Agreement
  - 1,287.39 acre-feet between June 1 and September 30, 2014
  - Similar agreement entered in March, 2015
  - Agreements lacked approval under Water Code section 1211

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The image features a decorative graphic of four horizontal, wavy, light blue lines that span across the middle of the page. The word "END" is centered in a dark blue, serif font, overlapping the middle of these wavy lines.

END

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